0410/010/017
1927
H

LIBRARY, ALBERTA AGRICULTURE
7000 - 113 STREET, EDMONTON
ALBERTA, CANADA T6H 5T6

...of this Bulletin for Distribution Outside Manitoba: Twenty Cents per Copy.

MANITOBA FARMERS' LIBRARY

Published by the Manitoba Department of Agriculture and Immigration

WINNIPEG, CANADA, JUNE, 1927

The Manitoba Farmers' Library is a series of bulletins that are devoted to the extension of information on Agricultural and Home Economics subjects, and that are distributed free among the people of Manitoba who make application for them. If any particular bulletin is wanted, ask for it as Extension Bulletin No..... All requests should be addressed to:

The Publications Branch, Manitoba Department of Agriculture, Winnipeg.

EXTENSION BULLETIN No. 85.

PLEASE
Do not throw this away; if of no value to you, pass on to someone else who may be interested in the subject.

DAIRY CATTLE

Cows on Sweet Clover Pasture

Part 1 by J. M. BROWN, Assistant Professor of Animal Husbandry

Part 2 by ALFRED SAVAGE, B.S.A., D.V.M., Professor of Animal Pathology

MANITOBA AGRICULTURAL COLLEGE,
WINNIPEG, MANITOBA

Published by authority of Hon. A. Prefontaine, Minister of Agriculture and Immigration

Part 1

DAIRY CATTLE

THE PLACE OF DAIRY FARMING IN MANITOBA

The history of the development of dairy farming in Manitoba is but a repetition of that of other provinces and countries where dairying is practised. In the early stages where the condition of cheap lands and meagre population prevailed, we find the extensive and wasteful system of ranching being practised. Gradually, with the increasing population and as lands were taken up, this sytem gave way to cultivation. The wheat belt spread itself gradually north until, at the present time, we find the wheat crop the mainstay of Manitoba agriculture. Recent years have witnessed a remarkable change, however, in the direction of mixed farming.

The problem of soil-drifting—the direct result of depleted humus content, resulting from exclusive grain growing—has been engaging the attention of farmers and soil experts. The demands of the soil for a return of the manurial ingredients removed by successive grain crops, and the needs of increasing population for more milk and meat obviously can be met only by the adoption of a more permanent system of agriculture—rotation of crops and the raising of live stock. Moreover, as lands continue to advance in value, necessitating greater revenue per acre, with the betterment of shipping facilities and the spread of education regarding the food value of milk and its products, the man who invests in the dairy cow business need have no fear of the future.

Considered from the standpoint of economy of production, the dairy cow holds the premier position amongst domestic animals. Experiment records show that from 100 lbs. of digestible food the cow will produce milk containing 18 lbs. of solids, all edible; whereas, from the same quantity of food, the fattening steer will produce only 2.8 lbs. of edible solids, the lamb, 3.23 lbs., and the pig, 15.6 lbs.

Not only does the dairy cow give good returns for food consumed, but by reason of her great capacity she can make use of large quantities of roughage which might not otherwise find a market. Nor must the extent to which the milk cow aids in the conservation of soil fertility be overlooked. Even where milk is sold, the loss to the soil of plant food elements is much less than is the case with grain or beef, and where cream or butter is sold the loss becomes a negligible quantity.

It is true, on the other hand, that there are certain aspects of dairy farming not quite so favorable. The difficulty of obtaining adequate and efficient labor at a reasonable price is perhaps the greatest single factor, responsible alike for men going out of the business and hesitating to invest in it. The labor incident to the proper care of milk stock is constant—there are no holidays in the calendar of the dairy cow—and is consequently regarded by most help as mere drudgery.

Further, and more particularly in the case of specialized dairying, where well-bred, high-producing stock are essential, the initial outlay of capital is very great, and the risk of loss through disease considerable.

FOUNDING A DAIRY HERD

Everything that is built up, to be good, must have a good foundation—whether it be a business, a house, a reputation, or a dairy herd. It is true that by the expenditure of considerable capital one may, by purchase, assemble in quick time a herd of well-bred, high-producing individuals; but, even in this instance the herd must lack that uniformity and potency in breeding, characteristic of long established herds, in which careful selection has been practised. The aim, therefore, should be to acquire by breeding rather than by extensive and indiscriminate purchase. In either case, of course, the nucleus must be purchased, and right here the beginner must decide whether this shall consist of grades or pure-breds. No breeder of experience will dispute the superiority of the good pure-bred. Given two individuals—grade and pure-bred—both equally good from the standpoint of milk production, the pure-bred is still the more valuable animal, by reason of the greater certainty with which she will tranmit her milking qualities to her offspring. On the other hand, good pure-bred cows are decidedly more costly, and in the hands of inexperienced persons the loss through disease and mismanagement may be considerable. Probably the wisest course, then, for the beginner possessed of limited capital and experience is to select for foundation stock common cows possessed, as far as possible, of desirable dairy conformation. By continuous top-crossing of these with a pure-bred sire, the progeny in the sixth generation—as the following table shows—become practically pure, although they never can become eligible for registration.

Disappearance of Unimproved Blood by the Continuous Use of Pure-Bred Sires

GENERATIONS	SIRES Per cent of purity	DAMS Per cent of purity	OFFSPRING Per cent of purity	OFFSPRING Per cent of unimproved
1	100	0	50 ($\frac{1}{2}$)	50 ($\frac{1}{2}$)
2	100	50	75 ($\frac{3}{4}$)	25 ($\frac{1}{4}$)
3	100	75	87.5 ($\frac{7}{8}$)	12.5 ($\frac{1}{8}$)
4	100	87.5	93.75 ($\frac{15}{16}$)	6.25 ($\frac{1}{16}$)
5	100	93.75	96.87 ($\frac{31}{32}$)	3.12 ($\frac{1}{32}$)
6	100	96.87	98.44 ($\frac{63}{64}$)	1.5 ($\frac{1}{64}$)

Indeed, the improvement even in the first generation (that is, the half bloods) is so marked that it is obviously the poorest possible business to have a herd of any size dominated by a "scrub" sire. Nor must the herd be allowed to revert. "Once used, always used," should be the policy with respect to the pure-bred bull, always bearing in mind that as soon as one of the graded offspring is used as a sire, all improvement ceases. Wherefore, by this method of grading and judicious selection a herd of high-producing cows may, eventually, be produced and by degrees, as the returns from the sale of dairy products warrant, the grade individuals may be replaced by good pure-breds.

WHAT CONSTITUTES DAIRY TYPE OR CONFORMATION?

In collecting the foundation, it is most essential that the purchaser have a clear conception of the essential features of a dairy cow. It is true that in the last analysis the scales and Babcock test are the only infallible indicators

of a cow's ability to produce; nevertheless, a good judge can usually, by external characteristics, discriminate between good and poor producers. This ability is all the more necessary when purchasing grade stock, milk records of such being seldom available.

Form, in the dairy animal, is largely the result of function. A cow, to produce heavily, must consume heavily; consequently, the barrel or middle assumes proportionately greater development than with other classes of live stock. So with other points of conformation; the whole ideal dairy form is admirably adapted to the special function of milk production. Space will not permit of a detailed description of the parts as outlined on the score card for dairy cattle; suffice, therefore, to mention the main essentials:—

GENERAL OUTLINE:—The general body characteristics of the dairy cow bespeak fitness for the special function of milk production. There is leanness of all parts, decided angularity, an openness of structure and clean appearance of head, which denote a high degree of nervous energy. Viewed from the side, the body is much deeper at flank than heart (shallow-flanked cows are cows lacking in capacity or assimilative power); viewed from behind, the body tapers from hips to withers; and from the front, the shoulders are seen to run up obliquely.

HEAD:—Indications of dairy temperament are found in the eye, which should be prominent and bright; in the muzzle which should be wide; in the large nostril, dished face and prominent facial veins.

BARREL:—The dairy cow should have a long, fine neck—shortness and thickness here are features invariably associated with the beefing propensity. The shoulders should be fine, bare of flesh, and fit snugly into the fore-ribs. The top-line from withers to tail-head should be level and strong, the sagging or "fish-back" corformation being particularly objectionable. The middle or barrel must be capacious. The ribs should be long and well-sprung, and the chest wide and deep, whereby the digestive organs, the heart and lungs, may have full play, permitting of great assimilation of food.

HINDQUARTERS:—Hip and pin bone prominent and wide apart, good length between hips and pins, and thighs not too beefy, are characters usually correlated with capacious, well-balanced udders and consequently with high-producing individuals.

MAMMARY SYSTEM:—The teats, udder, milk-veins and milk wells taken collectively constitute the mammary sytem. The udder is of first importance. It should be large and made up of secreting or glandular tissue. Some udders are large enough, but composed of fatty tissue, which is useless for the secretion of milk. The fine quality secreting udder, when empty, should present the appearance of loose folds of pliable, mellow skin covered with fine, silky hair. Furthermore, the udder, to have capacity and balance, must be attached high behind and stretch well forward on the belly. Common defects are pendulous udders, light fore-quarters and poor attachment behind, which latter eventually gives rise to a broken-down condition.

Each quarter should be sound and the teats of good size, evenly placed, and free of any obstructions or defects of the duct.

The milk veins (which are really blood vessels, are important in so far as their size is an indication of the amount of blood being conveyed to the udder, and since milk is a product of the blood, the inference is obvious. The main vein can be traced from the fore udder, running forward on the abdomen,

giving off one or more branches and each branch re-entering the body through an aperture known as the milk well. The larger and more tortuous the veins are, the better; whilst, when a cow is dry and the milk veins are not in evidence, the wells convey some idea of the size of veins entering them.

CHOICE OF BREED

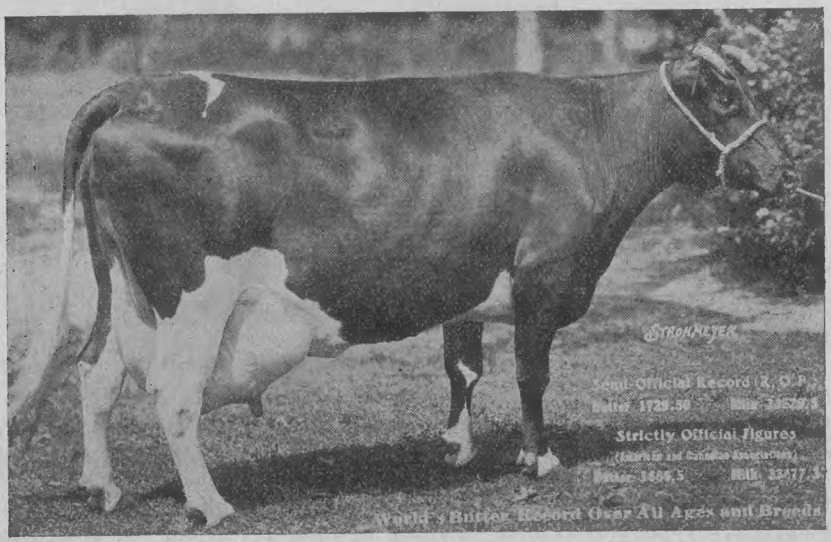
The choice of breed receives from the farmer perhaps a little more attention than its importance demands. Generally speaking, all of the recognized dairy breeds are good. Each is the outcome of long years of careful breeding, feeding and selection, and while one may be better adapted than another to a given set of conditions, it is generally conceded that success depends not so much on the breed as on the strain within the breed and the methods of management.

There are good and poor strains in every breed, and, further, a good strain of today will surely, in a few years in the hands of a careless breeder, have lost most of its valuable characteristics.

An exhaustive treatise on the history of development and characteristics of each breed scarcely comes within the scope of this bulletin. That which follows is intended merely to convey to beginners some information respecting the form and characteristics of the leading dairy breeds in the West.

HOLSTEIN FRIESIAN

The Holstein is the oldest and largest of the dairy breeds. It had its origin in Holland, where cattle noted for their dairy qualities have been bred for over 2,000 years. Indeed, writers on agriculture maintain that at some period, Holstein blood entered into the formation of most of our breeds of cattle. The first importations into this country were made in 1795. Since



Holstein Cow, Dekol Plus Segis Dixie, Holder of World's Strictly Official Record for Butter-fat.

that date, very great development has taken place in the way of increased production until, at the present time, we find the Holstein breed has acquired a reputation the world over for heavy milk production.

FORM AND CHARACTERISTICS:—Mature cows weigh from 1,200 to 1,800 pounds; whilst bulls vary around 1,900 to 2,700 pounds. Holsteins have not hitherto been noted for symmetry of form; in fact, this feature has to quite an extent been lost sight of in the effort to improve the milking qualities. It may be truly said, however, that this breed has at no time been spoiled through the breeding in of "fancy" points having no utility value.

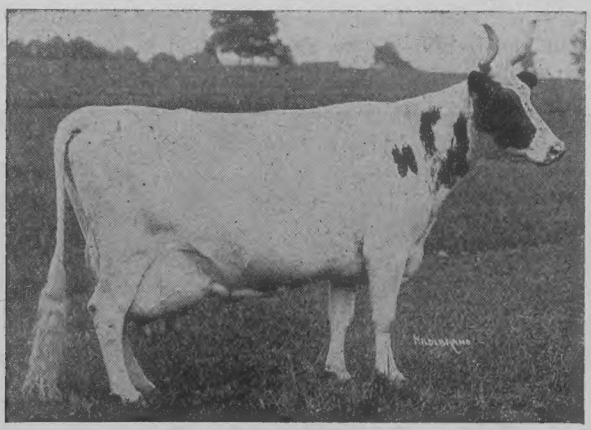
The color is black and white, the markings being quite separate and distinct.

Cows are large of frame, capable of consuming a large quantity of rough feed and in return of giving a large flow of milk. The fat content of the milk is not quite so high as might be desired, but careful selection is being made to this end which will doubtless result in an average higher quality of milk produced.

The calves are large, 90 pounds at birth being a common weight. They make rapid gains and are, therefore, very suitable for vealing purposes.

AYRSHIRE

The history of the breed is quite obscure, but it is generally considered native of the county or shire of Ayr, Scotland. Certainly for a great many years this district has been famous for the abundance and excellence of its dairy produce. Close attention in selection has been paid to dairy qualities



Ayrshire Cow, Combining Type and Utility Qualities.

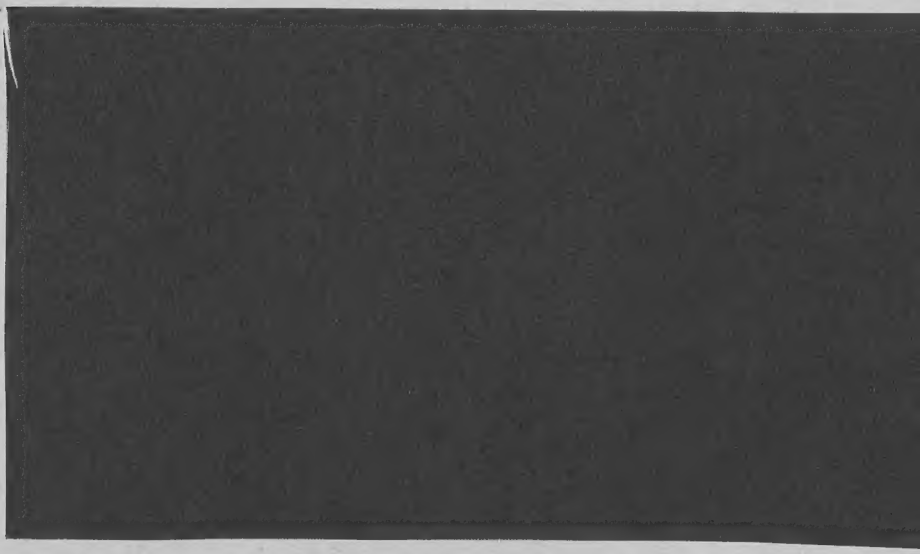
which, together with the hardiness developed by a somewhat rugged environment, have given to the Ayrshire the qualities for which it is justly popular. There would seem unfortunately to be a prevailing opinion that the Ayrshire is characterized by the possession of small teats. It is true that at a period in the development of the breed, show-ring standards called for a comparatively small teat. This fashion persisted in many herds, but as opposed to these are hundreds of heavy producing herds in which the big commercial cow with shapely udder and good teats prevails.

FORM AND CHARACTERISTICS:—In size the Ayrshire ranks medium, mature cows weigh from 900 to 1,200 pounds, and bulls 1,400 to 2,000 pounds. When dry the cows can be made to take on considerable flesh. They dress out well for a dairy breed, and the meat is well-colored and of good quality. For crossing purposes the Ayrshire excels. Crossed with the beef breeds, especially the Shorthorn, the cross-bred females milk well and are easily beefed off, while the male calves can be converted into very good steers.

Milk records reveal fewer exceptional producers among Ayrshires than Holsteins, but the average yield is high and the fat content of milk superior to Holstein but inferior to Jersey and Guernsey. The breed is hardy, and seems to be able to adapt itself to any climate or set of conditions, doing well alike in Siberia and India.

JERSEY

This breed also derives its name from the country of origin, namely, the Island of Jersey, which is one of a group lying at the entrance to the English Channel. The Jerseys are supposed to be descendants of the old red Normandy breed, to which they still bear some resemblance, although very much improved in type. By reason of the insular position of Jersey, the work of



Jersey Cow, a Model of Dairy Type. (Courtesy Nor'-West Farmer).

improvement of the breed has been greatly facilitated. Since 1763 laws have been in force prohibiting the importation of cattle other than Jerseys except for immediate slaughter.

This breed was imported into Canada the latter half of the 19th century. Representatives of the breed are at present to be found in every province of the Dominion, although the breeding herds are largely confined to the Eastern provinces and British Columbia.

FORM AND CHARACTERISTICS:—In general conformation a good Jersey cow is all that a good dairy cow should be. The angular form is most pronounced, the barrel or middle capacious and the udder of good size and well balanced. The Jersey is the smallest of our dairy breeds. Mature cows weigh around 900 pounds and bulls 1,400 pounds.

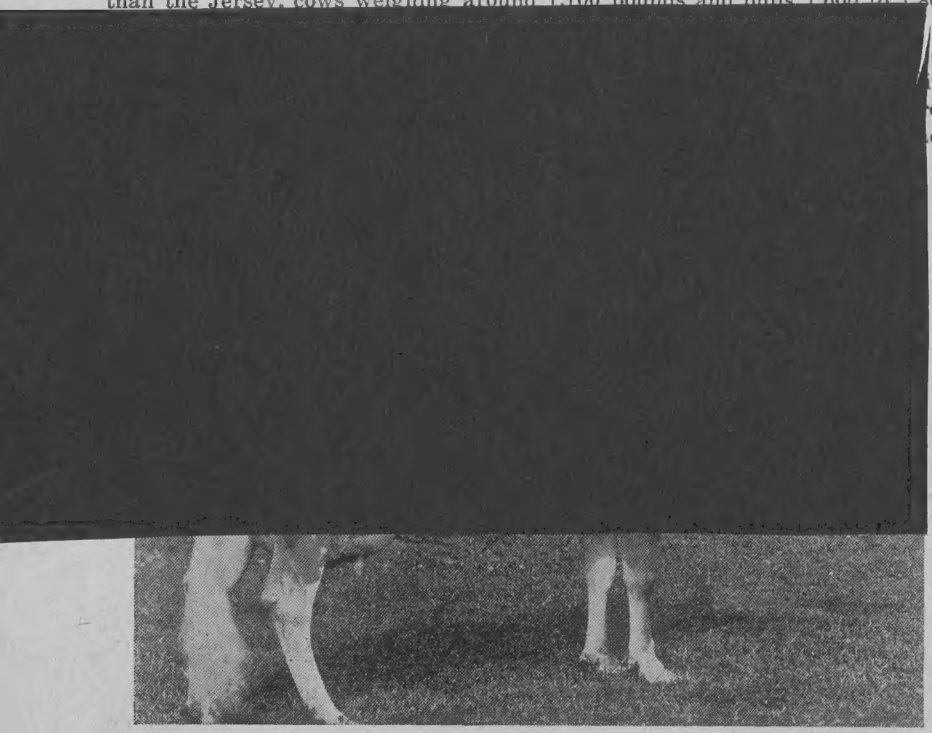
The color of the breed varies all the way from cream to almost black, but perhaps the most common color is light with dark on head and below the middle line. The muzzle is black and the horn fine and in-curving. In point of utility the Jersey is considered an economical producer of rich milk, the average fat content thereof being 5%.

The breed is inherently of a somewhat nervous temperament, and must therefore be handled gently. It is generally considered to be best adapted to mild climates, although when properly housed, as under Manitoba conditions the dairy breeds must be, it has given satisfaction.

GUERNSEY

Guernsey is another of the Channel Islands, from which the breed name is derived. The origin is said to be the same as the Jersey, namely, French, but different standards in selection have resulted in the rather different types evolved.

FORM AND CHARACTERISTICS:—The Guernsey of today is larger than the Jersey, cows weighing around 1,100 pounds and bulls 1,600 to 1,800



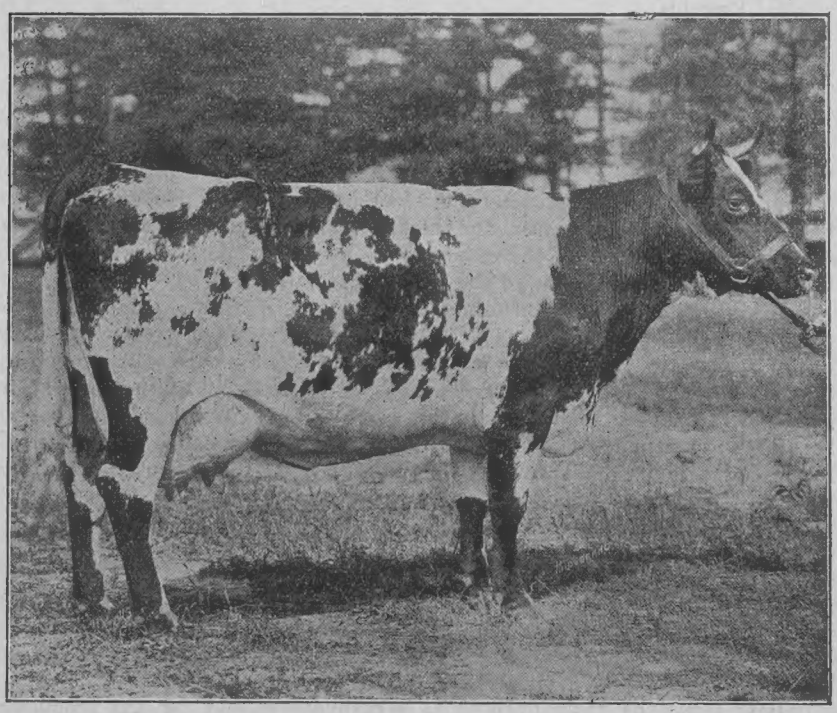
A Good Guernsey Type. Sold at Auction for $22,500. (Courtesy Nor'-West Farmer).

DUAL-PURPOSE

Where the main source of revenue on the farm is specialized dairy stock, comparatively large returns in milk must be obtained, because the calves cannot be converted into good beeves, and neither do the cows make good beef carcasses when past the age of breeding for profitable production. Again large milk yields are dependent on a set of conditions providing for nutritious hay crops, succulent feed, mixed grains, market facilities and efficient, reasonably priced labor—conditions by no means general in Manitoba. For these reasons many farmers prefer to handle a small number of cows which milk fairly well and are yet possessed to some extent of the beefing propensity. Hence the great demand in recent years for the so-called dual-purpose type of cow.

Because of this duality of function, considerable diversity in type exists amongst dual-purpose breeds. Essentially so, because where careful selection is made for milk, the type evolved will eventually conform more to the dairy form, and vice versa. In general, however, the conformation of the dual-purpose animal partakes more after the beef type. There is an absence, it is true, of the extreme depth of fleshing and low-set blockiness of the purely beef animal, and withal there is evidence of milking qualities in the development of udder, milk veins and lighter fore-quarters.

There are several recognized dual-purpose breeds in Canada—Shorthorn,



Dual Purpose Shorthorn Cow.

Red Poll, and Devon. Of these the Shorthorn and Red Poll are the only two represented to any extent in Manitoba.

As already stated, the demand for dual-purpose animals is keen; a demand which by reason of the scarcity of breeders who are practising careful selection by means of milk records, is difficult to meet.

What, then, is the remedy for the situation? Firstly, it should be clearly understood that the external appearance with respect to beef qualities together with authentic milk records of the ancestry are the only safe guides in purchasing dual-purpose animals. Again it is well known that a great many Shorthorns, even those which would classify as "Straight Scotch," bear evidence of good milking qualities.

Obviously, therefore, if more were milked by hand and records of production kept, the field for selection would be vastly augmented.

CONSTITUENTS OF FEEDS AND THEIR USES IN THE ANIMAL BODY

A knowledge of the various constituents of feeds and the purposes which these serve in the life processes of an animal, is essential to intelligent feeding of any class of live stock. There are four main groups of feed nutrients, all of which are contained in varying amounts in the various grains, grasses, clovers, etc., produced on the farm:—

1. Proteids.
2. Carbohydrates.
3. Fats.
4. Ash.

PROTEIDS

The proteids are quite complicated substances, but the essential element in their composition is nitrogen. Protein is immediately concerned with the formation of the muscle structure, the internal organs, the blood, hide, horns, hoofs and hair. It is essential for the production of milk, the solids of which contain protein matter to the extent of 25 per cent, and enters largely into the formation of the foetus of the unborn animal.

Moreover, there is a constant wear and tear of tissues going an in the body which can be made good only by the elaboration of protein elements. Proteids, therefore, are very important substances, more especially since these cannot be replaced by any other group of nutrients. In other words, an excess of carbohydrates and fats in the ration will avail nothing if the proteids be present in insufficient quantity. Amongst our commoner feeding stuffs, bran, shorts, linseed meal, alfalfa and clover are particularly rich in protein.

CARBOHYDRATES

Starch, various kinds of sugar, gums and crude fibre together constitute the carbohydrates. The main function of these is to supply heat and energy to the animal body, but when supplied in excess of this requirement they may be the source of much fat, stored in the tissues. Barley, corn and rye are all characterized by high starch content and low protein.

FATS

Fats serve the same purpose as carbohydrates, but for the production of heat and energy have 2.25 times the value of the latter.

ASH

The ash or mineral constituents of feeds are of the utmost importance. Indeed, animals totally deprived of mineral salts will die in a very short time. Most of the common grains and roughages, however, supply a sufficiency of mineral salts with the exception perhaps of lime-phosphate compounds and common salt.

The former enters largely in the composition of the skeleton, and can therefore be fed advantageously to young growing stock, more particularly where alfalfa or clover—both rich in lime—is not being fed.

Common salt is commonly fed as part of the daily ration, which increases the palatability thereof as well as satisfying the craving for this element.

BALANCING RATIONS

It may be argued that, given the feeds, the problem of feeding becomes as easy one; yet in point of fact, either through indifference or ignorance of essentials, a great many poorly balanced rations are fed. Feeding is at once the practice of a science and an art. The art lies in recognizing and catering to the individual likes and dislikes of animals and their temporary derangements. Scientific practice involves the application in feeding of principles established as a result of a great mass of investigational work.

A ration is balanced when it contains the nutrients—protein, carbohydrates and fat—in such proportion and amount as will properly nourish a given animal.

The results of experimental work which has been done to determine this by numerous investigators and covering a long period of years, would fill volumes. Suffice to say that the outcome of it all has been the establishing of what are known as feeding standards or tables in which is stated the exact amount of each nutrient which should be fed under a given set of conditions in order to secure best results. For information on the application of feeding standards, the reader is referred to any of the standard texts on dairy cattle.

It is perhaps sufficient to state here that the chief difficulty which arises in formulating rations for dairy cows is in securing a sufficiency of protein and this at reasonable cost. The coarse grains—oats, barley, and rye—are relatively low in protein, as also are the more common roughages such as prairie hay, sheaf oats, red top, etc.

Oil cake meal is at present the only high protein feed available on our market, and, though costly, its use can generally be recommended, where only common hay is available and cows are of the improved type which respond to good feeding.

It must be obvious, however, that the less purchased feed used the lower is the cost of milk production. Here is the place of the legume hays—alfalfa, the clovers, vetches, peas—all of which are relatively high in protein, and by the use of which, together with the coarse grains, rations can be fairly well balanced for milk production. Indeed, it is probably not claiming too much for the clover crops that on their cultivation depends the expansion of Manitoba's dairy industry. The feeding problem, therefore, under Manitoba conditions, resolves itself into the following. When legume hay is available and cows are not being forced for high production, it will not be necessary to make use of a purchased concentrate. The common hays, however, require balancing with purchased protein. The choice is commonly between bran

and oil cake meal, and should be determined by the cost of protein in each. Thus:

Oil cake meal contains 30.2 lbs. protein in each 100 lbs. Suppose it to be worth $50.00 a ton, then the contained protein is worth

$$\frac{\$50.00}{30.2 \times 20} \text{ equals } 8\tfrac{1}{4} \text{ cents per pound.}$$

Bran contains 12.5 lbs. protein in each 100 lbs; therefore, at $26.00 per ton its protein costs

$$\frac{\$26.00}{12.5 \times 20} \text{ equals } 10\ 2/5 \text{ cents per pound.}$$

SOME SUITABLE RATIONS:—The following rations are fairly well balanced for cows weighing around 1,200 lbs. The grain mixture should be fed at the rate of 1 lb. to each 3½ or 4 lbs. of milk produced. The hay should be fed to the limit of consumption, but the quantities given are such as cows will normally consume:

Ration Number	Rate of Feeding Grain Mixture	Proportions of Grain Mixture	Roughage Fed per Day
1	1 lb. to each 3½ or 4 lbs. of milk produced	Oats .....500 lbs. Barley ....200 " Oil Cake Meal ....200 "	Prairie Hay or Brome, Red Top, Sheaf Oats, etc. ..... 22 lbs.
2	1 lb. to each 3½ or 4 lbs. of milk produced	Oats .....400 lbs. Barley ....300 "	Sheaf Oats, etc. ..... 10 lbs. Alfalfa or Sweet Clover ..... 10 "
3	1 lb. to each 3½ or 4 lbs. of milk produced	Oats .....500 lbs. Barley ....200 " Oil Cake Meal ....200 "	Sheaf Oats, etc. ..... 10 lbs. Silage ..... 40 "
4	1 lb. to each 3½ or 4 lbs. of milk produced	Oats .....500 lbs. Barley ....200 " Bran .....300 " Oil Cake Meal ....100 "	Sheaf Oats, etc. ..... 10 lbs. Silage ..... 40 "
5	1 lb. to each 3½ or 4 lbs. of milk produced	Oats .....700 lbs. Bran .....200 "	Alfalfa or Sweet Clover ..... 10 " Silage ..... 40 "

MINERAL REQUIREMENTS

There are some eight mineral elements essential to the life processes, but of these there are only four ever likely to be lacking in the feeds commonly supplied. These are lime, phosphorus, chlorine and iodine. Lime and phosphorus are the main constituents of the animal skeleton and are also present in the solids of milk. Chlorine is intimately connected with the process of digestion. The proper functioning of the thyroid gland is dependent on iodine, a deficiency of which commonly manifests itself in "goitre" or "big neck." A deficiency of lime and phosphorus may result in bone weakness, enlarged joints, stiffness, or depraved appetite, as displayed by a tendency to chew sticks, bones and other matter.

It is good feeding practice, therefore, to include lime, phosphorus and salt (which conveys chlorine) in the ration, and where cases of goitre have occurred, some potassium or sodium iodide should also be regularly administered.

There are various forms of lime equally suitable; such as slaked or hydrated lime, ground limestone, or gypsum, any of which can be conveniently fed with the grain mixture at the rate of 4 pounds lime to 100 pounds of grain. The only suitable source of phosphorus in Manitoba is ground bone, also known as steamed bone flour. This is a by-product of the packing plants, and contains two elements—lime and phosphorus. An allowance of 4 pounds per 100 grain mixture is in order, or if both lime and ground bone are fed, an allowance of 2 pounds of each per 100 pounds grain will suffice.

The requirement of salt (sodium chloride) is 1½ to 2 ozs. per mature cow per day. Some salt added to the grain mixture increases the palatability of the latter, but in addition it is well to give frequent saltings in the mangers.

It should be observed that green feed increases the assimilation of lime, therefore many now follow the practice of feeding salt and lime together when cows are at pasture, whereby a reserve of lime may be built up in the skeleton, which cows will draw upon when in full milk and on dry feed. The proportion here may be 1 part of salt by weight to 6 parts lime.

It may or may not be necessary to feed some form of iodine, according to whether goitre has made its appearance in calves.

Undoubtedly the most convenient form in which to feed iodine is to mix potassium or sodium iodide with common salt at the rate of ½ pound of iodide to one ton of salt, or one ounce of iodide to a barrel (280 lbs.) of salt. An allowance of two ounces of this salt mix per head per day will furnish the salt requirements as well as provide for any deficiency of iodine in ordinary feeds.

It is of the utmost importance that the iodide and salt be uniformly mixed, to which end the iodide (one ounce) may be dissolved in about a gallon of hot water and sprinkled over the salt (280 lbs.) and the mass thoroughly mixed with a shovel.

NATURE AND SUITABILITY FOR DAIRY STOCK OF THE COMMON FEEDING STUFFS

GRAIN FEEDS

Oats:—Of the farm grown grains, oats is by far the most widely used for stock feeding. The actual feeding value depends largely on the percentage of hull, which varies from 20 to 45%. Being bulky, highly palatable, fairly high in protein and mineral matter, it makes an excellent feed for milk cows. Also it is pre-eminently suited to the development of bone and muscle in young and growing stock.

Barley:—There has long been an unaccountable prejudice against barley for the feeding of dairy cows—a prejudice which is not justifiable in the light of experimental feeding data. In composition it is decidedly higher in starch than oats, and lower in protein. It therefore finds its best use fed with other grains and, particularly when the roughage is high in protein, such as clover, alfalfa or pea straw.

Rye:—Rye is higher in starch again than barley, but lower in ash and fat. It is not very palatable, and for this reason is not widely used for dairy stock. When badly infected with the fungus ergot, it may be poisonous to stock.

Wheat:—By reason of its high market value, wheat is not used for feeding purposes. Occasionally damaged grain, however, may be fed to advantage. It is high in starch; when ground, very "close" in its nature, and should therefore be diluted with bran.

Wheat Bran:—This is the chief purchased concentrate used to supplement the home-grown grains in Manitoba. It is higher in protein than oats, high in ash, but low in lime. Being appetizing, laxative, especially suited to feeding young stock, and valuable for lightening up a heavy grain ration, it has altogether a higher feeding value than the analysis would indicate.

Linseed Oil Meal:—This is a by-product in the manufacture of linseed oil, being the ground-up residue after the oil has been extracted from flax-seed. For limited use with all farm animals there is no more healthful feed. Its value as a "conditioner" is well known, imparting quality and gloss to the skin and hair.

Being very high in protein, it is widely used for balancing the ration of milk cows where low grade roughage is used.

Shorts:—Shorts is a by-product of the mills and consists of the finer bran particles with some flour. It is slightly higher in all three nutrients than bran. Being "close" and pasty in nature, however, shorts should be fed mixed with coarser grains.

Dried Brewers' Grains:—This is quite a valuable by-product of the brewing industry. It is high in protein, but also high in crude fiber and can therefore be fed in quite large quantities. Indeed, it is more in the nature of a protein roughage than a concentrate.

Dried Distillers' Grains:—This resembles closely brewers' grains, and is a by-product of the alcohol industry. The value of distillers' grains depends on the source, grains from corn being much higher in digestible protein than those from rye.

DRIED ROUGHAGES

Alfalfa:—Well-cured alfalfa is undoubtedly the roughage par excellence for milk production. It is particularly high in protein, having a feeding value ton for ton the equivalent of bran. It is also high in ash or mineral matter, especially lime, and excels all other roughages in point of palatability. Alfalfa hay, together with silage and the ordinary coarse grains, makes a splendid ration for dairy stock, whereas with low grade hay, such as prairie or slough, the use of a purchased concentrate becomes necessary.

Clovers, Vetches and Peas:—Where these crops can be grown to advantage, they make, next to alfalfa, the best roughages, because, being legumes, they are all high in protein.

Green-cut Oats:—This is another excellent roughage for dairy stock. Its value depends largely, however, on the manner of curing. When cut in the late milk stage, in small sheaves and put up not too many in the stook, it makes a very palatable and nutritious roughage.

Brome Grass, Western Rye, Red Top, Prairie Hay and Slough Hay—These constitute the lower grades of hays and are chiefly characterized by a low protein and high fibre content. When well-cured, however, one and all make very palatable roughages.

Fodder Corn:—Corn undoubtedly finds its greatest use for ensiling. Fodder corn has, however, a high feeding value, and by reason of the high yield per acre and its place in a rotation of crops, its cultivation is to be strongly recommended, even on farms not equipped with silos.

Straws:—Oats, wheat and barley straws are all low in quality roughages, being very high in crude fibre. Of these oat straw is the most nutritious, but all may be fed to advantage, particularly where silage is available to render them more acceptable when cut and mixed therewith.

Silage:—Slowly but surely silage is coming into its own in Western Canada. In its comparatively low cost of production, its succulence and palatability, it fulfils all the requirements of a main roughage. Moreover, its keeping qualities render it invaluable for summer feeding, especially where one is concerned with maintaining the milk flow during the months of sparse pastures. During winter again by chaffing and mixing with silage much low grade hay and straw, which otherwise would not find a market, can be rendered acceptable to dairy stock.

Almost any forage crop grown can be successfully ensiled. Corn in districts where it can be matured gives perhaps the best results, although in one feeding trial at the M.A.C., where corn was compared with sunflower silage, the results for milk production were slightly in favor of the latter.

AVERAGE DIGESTIBLE NUTRIENTS IN 100 POUNDS OF FEEDING STUFFS

Feed	Total Dry Matter Lbs.	Protein Lbs.	Carbo-hydrates Lbs.	Fat Lbs.	Nutritive Ratio
Alfalfa Hay	91.4	10.6	39.0	.9	1: 3.9
Sweet Clover Hay	91.4	10.9	38.2	.7	1: 3.7
Red Top Hay	90.2	4.6	45.9	1.2	1:10.6
Timothy Hay	88.4	3.0	42.8	1.2	1:15.2
Prairie Hay	93.5	4.0	41.4	1.1	1:11.0
Oat Hay	88.0	4.5	38.1	1.7	1: 9.3
Corn Fodder	81.7	3.0	47.3	1.5	1:16.9
Oat Straw	88.5	1.0	42.6	.9	1:44.6
Wheat Straw	91.6	.7	35.1	.5	1:51.7
Corn Silage (Well matured)	26.3	1.1	15.	.7	1:15.1
Corn Silage (Immature)	21.0	1.0	11.4	.4	1:12.3
Mangels	9.4	.8	6.4	.1	1: 8.2
Turnips	9.5	1.0	6.0	.2	1: 6.4
Potatoes	31.2	.9	24.2	.3	1:27.7
Oats	90.8	9.7	52.1	3.8	1: 6.3
Barley	90.7	9.0	66.8	1.6	1: 7.8
Rye	90.6	9.9	68.4	1.2	1: 7.2
Bran	89.9	12.5	41.6	3.0	1: 3.9
Oil Cake Meal	90.9	30.2	32.6	6.7	1: 1.6
Shorts	89.5	13.4	46.2	4.3	1: 4.2
Dried Brewers' Grains	92.5	21.5	30.5	6.1	1: 2.1
Dried Distillers' Grains (Rye)	92.8	11.8	29.4	6.0	1: 3.6
Dried Distillers' Grains (Corn)	93.4	22.4	40.4	11.6	1: 3.0
Peas	90.8	19.0	55.8	.6	1: 3.0
Beans	86.6	18.8	51.3	.8	1: 2.8

—From "Feeds and Feeding" by Henry & Morrison.

Roots:—Speaking generally, it may be said that a ton of roots is worth a ton of silage, but it is not worth any more. Roots cost more to produce, they are a less certain crop than corn or sunflowers, and, unlike ensilage, they cannot be held over summer for supplementing bare pastures. The growing of a few roots, however, is to be recommended because of the place which they fill in supplying succulent feed during the interval between filling and opening of silos.

WINTER MANAGEMENT OF MILK COWS

Milk yield, while largely an inherited character, is at the same time dependent to quite an extent on feeding and management. It has been demonstrated that no amount of feeding can force production beyond the inherited capacity, but, on the other hand, it is safe to say that the majority of cows in Manitoba, by reason of indifferent management, are not producing to capacity. The average annual milk production of cows in the province is placed at 3,700 lbs., whereas by judicious feeding and management an increase of 50% might reasonably be expected.

CARE BEFORE AND AFTER CALVING

Preparation for Calving:—A very important consideration is the preparation of cows for the lactation period.

Because of the heavy drain of milk production on the system, together with the drain incident to nourishing a foetus, the best cannot be expected of cows brought to the calving in thin condition. During the dry period, therefore, it is false economy to limit the ration to almost maintenance requirements, because the cost of additional feed necessary for inducing good bodily condition is negligible when considered in relation to the increased milk flow after calving.

Cows should be dried off six or eight weeks before freshening, and fed sufficient grain during this period to induce good bodily condition. About one week before the calving date the straight grain ration should be replaced by the "cooling" one of bran. This gives the digestive system a rest, tends to check extreme congestion of udder in the case of heavy milkers, and reduces the chance of cows getting a set-back by "going off feed" after calving.

Heifers perhaps constitute an exception to the above. With such the aim is to develop the mammary system as much as possible in the first lactation, hence with the deliberate purpose of inducing congestion the grain ration may be continued right up to the day of calving.

MANAGEMENT AFTER CALVING:—The act of calving does not call for special mention here, the troubles incident thereto being discussed elsewhere in the chapter devoted to diseases. Feed for the first two days after calving should be light, consisting mostly of bran. Gradually the regular "milk" ration may be introduced, beginning with one pound, the next day two, the next perhaps four, and so on gradually until cows are receiving full feed consistent with milk produced. Bringing cows on to full feed calls for judgment on the part of the feeder, since the desired end is the carrying of cows through the full lactation without receiving set-backs through going off feed.

ROUTINE OF FEEDING AND MANAGEMENT

Milk cows are to quite an extent creatures of habit. Regularity is a prime essential to profitable production; therefore it is well to follow some definite system of management.

Although a fairly common practice, feeding three times daily is unnecessary, unless in the case of very heavy-producing cows consuming a large quantity of feed. Indeed, experiment records show that as much milk at lower cost is produced with two feeds as with three feeds per day, the total quantity being the same in each instance.

When silage is available it is best fed before milking with the meal allowance thrown on top, but roots should always be fed immediately after milking in order to avoid flavors in milk.

Hay is best fed after milking, that the milk may not be polluted from a dusty atmosphere. The poorer quality of hay, if fed at night, is utilized to better advantage by reason of the longer time available for cows to pick it over.

It is highly important that milking be performed regularly and efficiently. Irregular and indifferent milking will most certainly shorten a cow's lactation period, and therefore reduce the potential milk yield. Exercise, while important during the long winter months, is all too frequently enforced at the cost of serious shrinkage in milk flow. It is well to realize that a heavy milking cow during her lactation is in a very relaxed condition, and consequently highly susceptible to chills and various external influences.

Cows in milk cannot, therefore, with impunity, be turned out for hours in zero weather. Watering is best done in the stable, but failing provision therefor it is well to provide the outdoor tank with a heater. Cows in full milk turned out in very cold weather will not usually partake of sufficient ice-cold water to supply their needs. Moreover, the cost of heater and fuel is small when considered in relation to avoidance of chills and increased returns from cows.

SUMMER MANAGEMENT

In the instance of spring calving cows, for a relatively short time while grass is abundant the yield is satisfactory. Soon, however, the factors which lower production are operative, some of which can be controlled and others only partially so.

Fall Freshening.—It is regrettable that more cows do not freshen in the fall. The total milk yield of fall calving cows is invariably greater because the change from dry feed to pasture affords a stimulus to production which almost equals that of a second freshening. More especially on cheap lands the cost of production is unquestionably lower where summer dairying is practiced, but by reason of the whole milk market being then over supplied, the price remains comparatively low. Likewise the scarcity of winter milk mitigates against the running of creameries to full capacity. More winter milk, therefore, would mean a reduction in creamery operating expenses and an ultimately better all round price to the producer.

Prolonged Benefits of Good Feeding.—To enable her to make the best use of pasture, a milk cow must carry a certain bodily reserve. Cows which are brought through the winter on straw and slough hay have undergone a

partial starvation, and it is well on towards fall before the tissues have been built up to the point where such cows are enabled to produce to the limit of their inherited capacity. But by fall, in the case of spring calving cows, the maternal impulse to produce milk has passed, and so the limiting of feed during winter to merely maintenance requirements must be regarded as an all round waste.

Supplementing Pastures.—Speaking generally regarding summer feeding, it may be said that it is not economical to feed grain in addition to pasture. Pasture in itself is a perfectly balanced feed, and so long as cows are receiving abundance of it they cannot utilize to advantage a supplementary grain allowance. The greatest problem in connection with summer feeding is the avoidance of checks to the milk flow, because once the flow has been checked—from whatever cause—it is next to impossible to restore the former level of production. The factors commonly responsible for these checks are bare pastures, heat and flies. Bare pastures can, of course, be supplemented, and it is the part of wisdom under our conditions always to provide for such. It is here that surplus silage can be used to great advantage. That which remains in the silo, therefore, should be carefully conserved by covering with a foot layer of cut straw or chaff and thoroughly watering. Oats, and peas, Sudan grass and alfalfa are all admirable soiling crops, and if not required to supplement pastures can, of course, be converted into hay. Provided with such supplementary feeds one can usually tide over fairly satisfactorily the period of dry pastures, which comes generally around the latter part of July and August. Quite frequently the fall pastures are good, but at this time there are two quite common practices to guard against:

Do Not Graze Alfalfa too Closely.—Those having alfalfa pastures are tempted to graze such too closely, and the result is winter killing. Alfalfa, of all pasture plants, can least stand close grazing. To avoid winter killing, plenty of cover must be left, so ensuring a good blanket of snow and at the same time the plants are not weakened.

Fall Protection.—Because of the fact also that pastures are commonly quite good in October, there is a temptation to leave milk cows out too late. Nights then are often cold and wet, and exposure to such will bring about a very rapid decline in milk yield. Earlier stabling, of course, entails greater expenditure for feed and labor, but this is more than counter-balanced by the longer sustained production.

Protection Against Flies.—Flies at this time of year are responsible for very great financial loss, because it so frequently happens that when pastures are abundant cows are molested to such an extent that they are unable to make the best use of these. Respecting spray mixtures it may be said that the majority of these convey only temporary protection, and such as are more permanent in effect have the disadvantage of being more or less ruinous to the hide and hair. A 5% creolin solution sprayed over the milk cows half an hour or so before milking is effective in keeping flies off until milking is done.

For the benefit, however, of those who wish to try a more permanent application, the following are recommended:

1.	Fish oil or raw linseed oil	1 gallon
	Oil of pine tar	2 ozs.
	Oil of pennyroyal	2 ozs.
	Coal oil	½ pint

2. 1 part water
   2 parts soap shavings
   4 parts pulverized rosin
   1 part fish oil. Boil this until the rosin is dissolved. Add 6 parts water, 2 parts oil of tar, 2 parts coal oil. Boil the whole 15 minutes and apply with a brush.

Perhaps the best protection from flies is afforded by straw and poplar pole shelters, erected in the pastures. These, if built with narrow doorways, are fairly dark inside, and most species of flies do not favor darkness.

CALF RAISING

The dairy calf is the potential milk cow. To a far greater extent than is commonly recognized, the efficiency of a milk herd depends on the success which attends the raising of calves. So many cows are spoiled, as it were, in the making, and invariably through injudicious methods of feeding and management.

Drinking from Pail.—Calves may be removed from their dams at birth or allowed to remain for a day or two, both methods being practised successfully. We favor the latter method, believing that calves get a slightly better start thereby. Little difficulty need be experienced in teaching calves to drink from a pail. With the calf backed into a corner of the pen, two fingers in the mouth, the head lowered into the pail, and the exercise of a little patience the desired end is usually accomplished.

CALF RATIONS

From this stage until weaning at six months is the critical period, and simple as the essentials to success are, it is failure to observe such that results in so many undersized "pot-bellied" calves. Whole milk is required for at least three weeks under any system of raising. The amount fed at the beginning depends on the birth weight and vigor of calf, the average requirement being one pound of milk for each eight pounds of live weight. An average calf weighing 80 pounds would therefore receive 10 lbs. of milk. For the first week the total milk allowance is better fed in three separate feeds—morning, noon and night—the smaller quantity fed at noon; later twice a day feeding is sufficient. Gradually the allowance is increased to 12 to 14 lbs. per day. After 3 weeks of age skim milk, if available, may be substituted for whole. The substitution must, however, be quite gradual, beginning with one pound per day, and so on until substitution is complete. Skim milk feeding is continued up till six months of age, but at no time should the quantity exceed 24 pounds. It is further very important that the milk be clean and fed warm, and milk cannot be clean fed from other than pails which are washed and scalded after every meal. Blood heat (90-100 degrees F.) is the required temperature; hence if separated milk must be held for a while it should be reheated before feeding. Additions to skim milk in the shape of various meal mixtures, while extensively fed, are not necessary. Separate grain feeding, however, cannot begin too soon, and therefore such should be provided at an early age. Very little may be consumed for a time, but a grain mixture should always be available, and that which is

not consumed replaced with fresh material from day to day; otherwise the grain becomes sour and a most certain source of digestive troubles. The staple grain supplement is oats—whole or rolled oats, because finely ground material is apt to cause indigestion, and in any case calves prefer the whole grain.

Some suitable grain mixtures are as follows:—

1.	Oats ..... 4 parts by weight Bran ..... 2 " " "	}	With alfalfa or clover hay.
2.	Oats ..... 4 " " " Bran ..... 2 " " " Linseed oil meal 1 " " "	}	With prairie, red top or other lower grade hay.
3.	Oats ..... 2 " " " Corn ..... 1 " " "	}	With alfalfa or other legume hay.

Hay, salt and water must always likewise be available. Second-cut, well-cured alfalfa or clover is best, but failing such, any other well-cured and fine hay. Coarse or badly cured roughage is not at all suited to the digestive system of young calves.

RAISING CALVES ON MILK SUBSTITUTES:—The raising of calves at reasonable cost is always something of a problem with shippers of whole milk. Feeding whole milk is altogether too expensive a method; moreover, there is the consideration of time and inconvenience which separating a small quantity involves, and frequently the difficulty of disposing of a small quantity of cream.

Two Calves Raised on a Home Mixed Calf Meal.
Top Calf 14 Months; Bottom, 7 Months.

Here is the place of the milk substitute in calf raising, and while it may be stated definitely that calves cannot be raised without some whole milk, it is also true that very satisfactory results can be obtained with a comparatively small quantity of whole milk and a milk substitute.

There are many proprietary calf meals on the market which may all be used with good success. Such are invariably expensive, however, and good results can be attained at much less cost through the use of mixtures compounded at home.

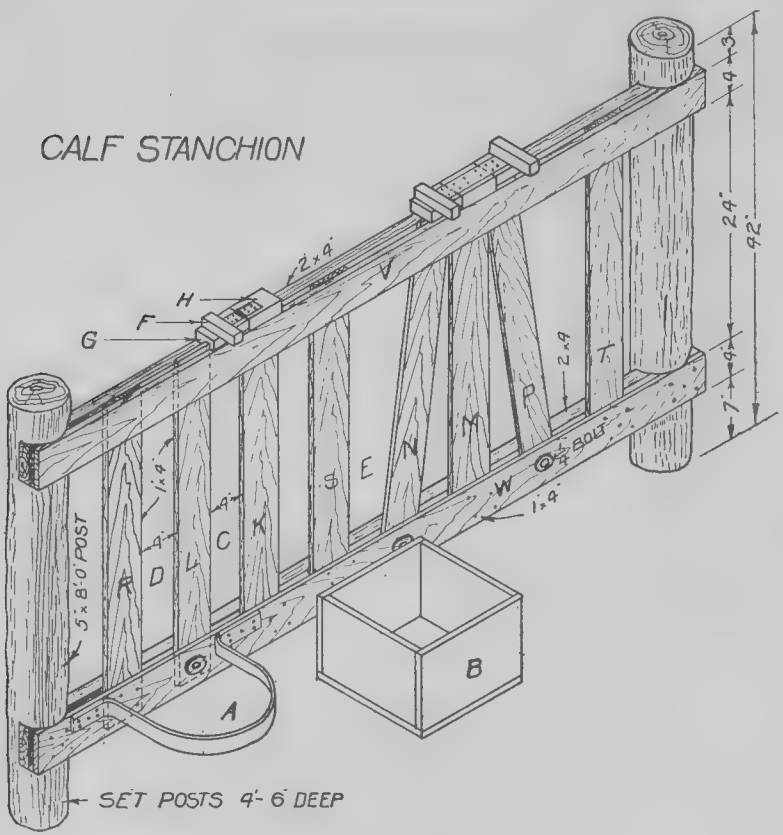
The following mixture has given excellent results at this station:—

Sifted ground oats	22 lbs.	
Shorts or low grade flour	25 "	1 oz. equals 2 tablespoonfuls.
Ground flaxseed	20 "	
Linseed oil meal	16 "	
Blood meal	3 "	
Salt	1 "	

This is fed as a warm gruel prepared by mixing the requisite amount of meal to a paste with cold water, then adding the right amount of boiling water and allowing to cool. By the time calves are four months old they will usually freely consume the meal fed dry.

Strictest attention must be paid to quantities, regularity of feeding and cleanliness. As a guide to feeding, the following schedule furnished by the Blatchford Corn Meal Co. is recommended:—

Age (days)	Milk (lbs.)	Calf Meal (oz.)	Water (lbs.)	Age (days)	Milk (lbs.)	Calf Meal (oz.)	Water (lbs.)
11	10	2.0	.00	34	4	11.5	5.75
12	10	2.0	.00	35	4	12.0	6.00
13	10	2.0	.00	36	4	12.5	6.25
14	10	2.0	.00	37	4	13.0	6.50
15	10	2.0	1.00	38	4	13.5	6.75
16	9	2.5	1.25	39	4	14.0	7.00
17	9	3.0	1.50	40	4	14.5	7.25
18	8	3.5	1.75	41	4	15.0	7.50
19	8	4.0	2.00	42	4	15.5	7.75
20	7	4.5	2.25	43	4	16.0	8.00
21	7	5.0	2.50	44	4	16.5	8.25
22	6	5.5	2.75	45	4	17.0	8.50
23	6	6.0	3.00	46	4	17.5	8.75
24	5	6.5	3.25	47	4	18.0	9.00
25	5	7.0	3.50	48	4	18.5	9.25
26	4	7.5	3.75	49	4	19.0	9.50
27	4	8.0	4.00	50	4	19.5	9.75
28	4	8.5	4.25	51	4	20.0	10.00
29	4	9.0	4.50	52	3	21.0	10.50
30	4	9.5	4.75	53	2	22.0	11.00
31	4	10.0	5.00	54	1	23.0	11.50
32	4	10.5	5.25	55	0	24.0	12.00
33	4	11.0	5.50				



CALF STANCHION

The cut shows a stanchion suitable for three calves. The posts are set 6 feet from centre to centre and cut so that a 2 ft. 4 inch crosspiece plus two 1 inch boards will fit and come flush with the edge of the post.

The following procedure is suggested:

Nail the 2 x 4 crosspieces in place.

Nail on the stationary pieces K and M, keeping their centres 2 feet apart and 2 feet from the centre of the posts.

Nail on pieces R, S and T, so the space between R and L, S and N, and P and T will be 4 inches.

Nail on the 1 foot x 4 inches pieces V and W. Place a 1 ft. x 4 inch nailing block under each end to keep them straight.

Fit the pieces L, N and P so the tops extend ¾ inch above the upper crosspiece and fit the lower end with a ¼ inch bolt with a nut and washer.

The fastening device at the top is made by nailing a short piece, H, 2 inch x 4 inch planed to 1½ inch, to the top of the crosspieces. The piece G can be hinged by means of a steel butt, small strap hinge or strong piece of leather. Nail on the small strip, F, as a handle for lifting up the catch.

A serviceable retainer, A, of sufficient size to hold a pail can be made from an iron hoop, and a box, B, about 12 inches square and 7 inches deep, can be made so that it will slide under the retainer A. Each space should be fitted with both a retainer and box.

VEALING DAIRY CALVES

The market value of veal in recent years has not been such as to make vealing of surplus calves a profitable enterprise. Certainly in conjunction with a whole milk trade it is out of the question. Recent work done at this College, however, would indicate that calves can be profitably vealed on a minimum of whole milk (318 lbs.) and the balance skim. Carried to the age of ten weeks, dressed and shipped to the retail trade, calves have yielded a labor profit of $8.60. The important factors are birth weight of calves, feeding, and dressing for the trade.

As a guide to computing possible profits the following information is submitted:—

1. Calves of dairy breeding 8 to 10 weeks of age will dress out about 56%.
2. On whole milk, daily gains of 2 lbs. may be expected.
3. On whole and skim milk, 1.6 lbs. per day is good gain.
4. About 10 lbs. (or 1 gallon) of whole milk is required to produce 1 lb. gain.
5. Average requirements for "skim milk" calves are 318 lbs. whole milk and 1290 lbs. skim to 10 weeks.
6. The birth weight varies with breed, age and condition of dam—Ayrshire 70 lbs., Holstein 85 lbs., Shorthorn 73 lbs.

HOUSING OF CALVES

Fall-dropped calves having passed the milk period are ready for pasture in spring. Spring calves, however, during the first summer are probably best confined to the stable, unless the outside conditions are hightly suitable, such as a small well-shaded pasture, close to the farm buildings. Maintained indoors during the rush season young calves are more likely to receive the regular attention which is so essential, and are further unmolested by heat and flies.

Overcrowding in small pens is something to be avoided, and the practice of keeping young calves tied up cannot be too strongly condemned.

Plenty of light, sufficient space to permit of exercise and protection from draughts are all prime requisites of calf pens. Draughts and wet bedding are very common causes of scouring. Pen partitions, if of iron, should be boarded up three feet or so or the pens protected in some other way from draught.

For convenience in feeding, prevention of milk and grain waste through spilling, insuring the right allowance to each calf and keeping calves from sucking each other, stanchions are well nigh indispensable. On page 22 is a cut and construction details of a stanchion which has proven very satisfactory.

DEVELOPMENT OF HEIFERS

The critical period in the life of a milk cow is that between birth and six months. Brought through this period satisfactorily, from the standpoint of vigor and size, the future development does not present much of a problem. Too frequently, however, heifers are left to choose between a straw pile and starvation, the effects of which cannot be overcome later, no matter how liberal the feeding.

Size and large barrel capacity being desirable points in a dairy cow, such should be developed as far as possible in the heifer. A liberal allowance of hay and silage, therefore, is in order with just sufficient (1 to 4 lbs. per day) of a grain mixture to induce growth without too much fleshiness.

Quarters for heifers should be roomy enough to permit of exercise, well-bedded for comfort, and sufficiently lighted and ventilated.

BREEDING AGE OF HEIFERS

The correct age for breeding has been a matter of some dispute, although now recognized to be determined largely by the breed to which an animal belongs and degree of development for a given age. The smaller dairy breeds—Jersey and Guernsey—mature somewhat earlier than Holsteins and Ayrshires, and may therefore be bred earlier. On the average, however, the breeding age may be put at twenty-one (21) months, if exceptionally well-grown at 18 months, and if development has been retarded, breeding is better delayed until twenty-four (24) months. The danger lies in systematic practice of breeding immature heifers, which results in permanent reduction in size and vigor of mature cows.

THE HERD BULL

BREEDING

There is, of course, no place in any constructive breeding enterprise for other than a pure-bred sire. Since it has long been established that the bull transmits milking qualities quite as much as the dam, it is obviously very important that the head of the herd have good milking ancestry. There is no room for a "hit or miss" policy to transmit milk. Pure-breeding, coupled with good milk records, are primary considerations in selecting a dairy bull, and with the number of cows now on official and semi-official test the field for selection is steadily increasing.

YOUNG OR OLD BULLS

There is an unfortunate but very general tendency to overlook the value of older bulls, the breeding powers of which have been proven satisfactory. In consequence, many excellent individuals are sent to the block long before their period of usefulness is over. Objections are that mature bulls are likely to be vicious, and that they are not such sure breeders. Viciousness in itself, however, is not a sufficient reason for discarding a bull. Most dairy bulls become cross sooner or later; moreover, it is well to bear in mind that the sluggish, docile brute is not likely to be very prepotent. There is some truth in the contention that old bulls are not such sure breeders, but this for the reason that in general bulls are not handled in such a way as to retain their active breeding powers. When properly fed and handled, they may be good for nine years and longer.

CARE OF BULLS

From birth until six months the young bull should be handled in the same way as heifers, with the exception that the whole and skim milk feeding period may be extended in order to secure maximum vigor and size.

RINGING THE BULL

At six months the sex instincts begin to manifest themselves, and hence segregation of the male calves is called for. When one year old it is time to have a ring put in the nose—a small, 2 inch copper ring at first, which may be replaced at maturity with a 3½ inch size of heavy gun metal.

Different articles are used for piercing the cartilage which separates the two divisions of the nose, from broken pitchforks to a special instrument for the purpose. A very convenient instrument, however, and one which may serve a double purpose, is the trocar and cannula (cattle size). This is the instrument used for piercing the rumen in cases of serious bloating. The instrument is driven through the nasal cartilage and the trocar withdrawn, leaving the cannula wherewith to guide the ring through. Until the wound has quite healed there should be no attempt to lead by the ring. Training to lead by the ring and staff calls for judgment; it affords an effective means of control but should not be abused. "Never trust a dairy bull," is a good motto—the "quiet" one invariably does the mischief. The essential point is to maintain control at all times, to which end box-stall partitions and paddock fences should be strong and leading staffs perfectly reliable. A wire cable stretching the full length of paddock with ring and rope attached permits of a bull taking exercise whilst still being under control.

SHOULD THE BULL RUN WITH THE HERD?

The practice of allowing bulls to run with the herd at pasture is not to be recommended. Under this system the tendency is to dissipation by too frequent service, breeding of heifers and cows before they are due to be bred and, what is by no means least, the constant attendant risk of human life.

On the other hand, where hand breeding is practised, it too frequently happens that the bull is kept closely confined in a stall and overfed on bulky low-grade roughage. Such treatment, if it does not render the bull completely impotent, most certainly lowers his virility, whereof calves are born inherently weak, giving infinite trouble in the raising. Exercise is essential to sexual vigor, and likewise good bodily condition, which can be maintained only by judicious feeding. Just enough grain should be fed to maintain the bull in fair flesh, but some grain is necessary. Should the tendency, on a given ration, be to put on too much flesh, then both the grain and roughage allowance must be reduced. Too often the grain is eliminated entirely and an excess of poor roughage fed, with the consequences already referred to.

SERVICE ALLOWED

Frequency of service and precationary measures against the transmission of disease are further points of management, which demand attention. The tendency is to overtax the energies of young bulls. Yearlings, if well-grown, may breed a few females, but under any circumstances service should be quite limited until nearly two years old, and in no instance should more than one service be allowed per cow when in season.

The bull may be an excellent medium for carrying and transmitting genital infections which later become manifest in abortions, sterility, retained afterbirths—any and all of these and other conditions.

Since, however, such conditions are being treated elsewhere under "Diseases," suffice here to say that it is the part of good management to so

treat the bull as to eliminate the possibility of his carrying infection. The sheath, therefore, should be disinfected at least after, and preferably before and after every service, using a 2% Lugol's Solution or a ½% Creolin Solution. For this operation an ordinary injection syringe serves the purpose. Slightly more effective, however, is a six foot length of heavy rubber tubing attached to a container, which, when held high, permits of the disinfectant being run in by gravitation. About a quart of disinfectant is sufficient, if this is held in the sheath for two minutes by hand pressure on the point.

HOUSING DAIRY STOCK

Barn plans and details of building construction scarcely come within the scope of this bulletin. For information thereon the reader is referred to the Engineering Department, Manitoba Agricultural College, Winnipeg. It may not here be out of place, however, to emphasize certain features which are of particular importance.

The consuming public is fast becoming educated to an appreciation of the great food value of milk, but likewise to an appreciation of the great danger of milk as a carrier of infection, particularly to the young. The demand, therefore, is becoming more insistent for milk from healthy cows and prepared under sanitary conditions. The maintenance of such conditions does not necessarily call for expensive buildings, but certain features are indispensable.

VENTILATION

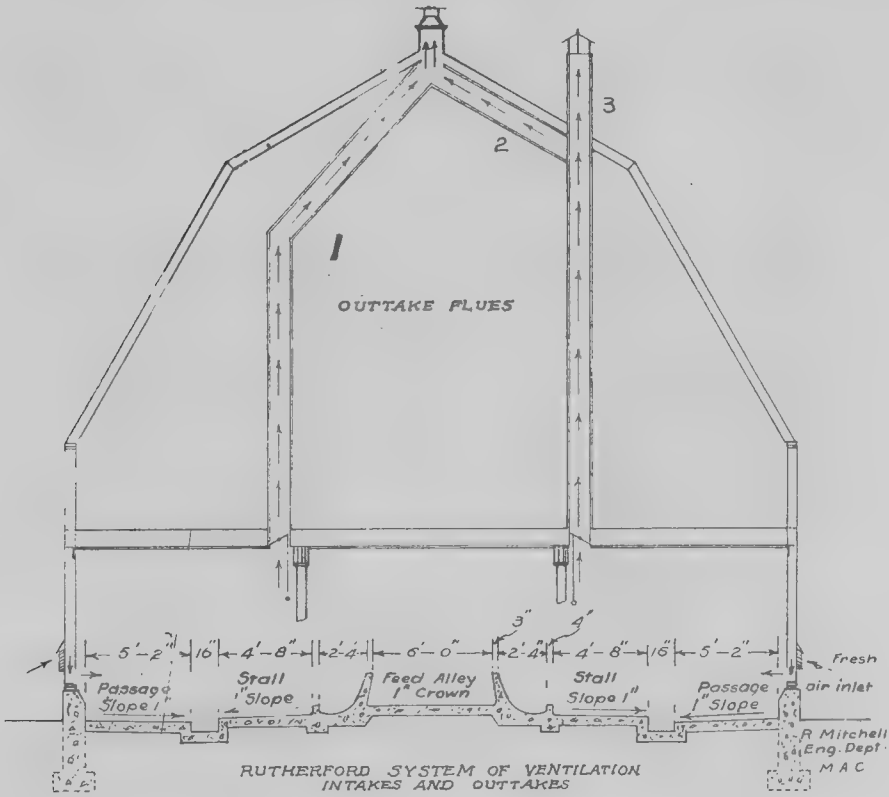
The maintenance of health in dairy stock is dependent in very great measure on proper ventilation, and yet it is safe to say that there is no other factor more commonly neglected. While perhaps the majority of new or remodelled barns are equipped with some kind of ventilating system, it is rather the exception to find such functioning properly.

The end sought, of course, with any ventilating system is sufficient warmth for animals, together with proper circulation of fresh air and elimination of foul; but such results, under our conditions of prevailing low temperatures for long periods, is sometimes rather difficult to secure. The following features have an important bearing on the efficiency of a ventilating system.

1. Direction of buildings. The main barn should run north and south, whereby there is a minimum of exposure to north winds.

2. Amount of cubic space per cow. Too much air space means insufficient heat and consequent condensation of moisture. 600 cubic feet per cow is ample, and in order to obtain this it is necessary to reduce ground plan dimensions to a minimum. The most common mistake is in allowing too much height to the ceiling. A height to ceiling of 8 feet is quite sufficient. Also there should be no waste space such as unnecessary passages and pens.

3. Size and direction of outlet flues. The important feature here is the directness by which outlet shafts reach the roof. Anything approaching the horizontal is to be avoided; the more perpendicular the flue, the better it will "draw." The Rutherford system of ventilation calls for a total outlet flue area just double that of the intake, and the intake area recommended for cattle is 15 to 18 square inches per head.



Three Ways of Carrying the Outlet Flues through the Loft. No. 1 leaves the Purlin and takes a steeper slope to the Cupola. No. 2 follows the roof and is too nearly horizontal. No. 3 is the most direct.

SYSTEMS OF VENTILATION:—The two systems in general use in Canada are the King and the Rutherford, the latter having proven superior by reason of greater adaptability to a wide variety of conditions. The special advantages of the Rutherford system are these:

1. Facility of controlling temperature in all parts of the stable.
2. Efficient operation under extremes of temperature and weather.
3. Ease of installation in old or new buildings.
4. Simplicity of operation and control.

The two systems, King and Rutherford, differ mainly in the manner of admittance and discharge of air, one being the opposite of the other in this respect.

The Rutherford system admits air near the ground and the warm foul air is discharged through flues at the ceiling. In the King system, the air enters about 3 feet from the ground and rises between the studding to a little below the ceiling, where it enters the stable. Foul air in the King system is drawn off by flues which come down to within a foot of the floor.

BARN FLOORS

Floors should be of cement construction, nothing else being as durable and sanitary. Cement platforms for cows, however, are not altogether satisfactory, since with these there is constant trouble from enlarged knee joints and abrasions of hocks, which latter become infected, entailing sometimes considerable loss. Dirt platforms are hard to keep clean, and the surface soon becomes irregular and uncomfortable.

A cork-asphalt composition has been used extensively, but has been proven not very durable and hence too costly. All things considered, perhaps the best arrangement is a plank platform overlying cement and constructed in such a way that the plank can be taken up to permit of cleaning.

MANGERS, TIES, BOX-STALLS

Mangers of concrete are most suitable. The top should be wider than bottom, the bottom rounded and about two inches above the level of cow platforms.

Double-chain ties and stanchion ties are equally sanitary. Some believe the former to be more comfortable, which others again dispute.

It is a great convenience to have lots of box-stall space. One box (10 feet by 10 feet) to every five cows will suffice.

MILKING MACHINES

It is safe to assume that the obvious and logical course for farmers to pursue during the immediate future is to lower the costs of production as much as possible. In milk production this can best be done through gradually getting higher producing cows, applying improved methods of feeding and management and reducing the cost of labor. While feed is the largest single item in the cost of milk production, amounting to 50% or more, labor costs are second only to feed, amounting to from 20 to 30% of the total cost.

To many farmers, the milking which must be done twice daily, seven days a week, the caring for the milk and the washing of the dairy utensils is the dreaded part of dairying. For these, this is what puts the drudgery into dairying, and they do not like it. Dairying would not be too bad, they say, were it not for the milking. It is true that considerable time is required for this work. Including the caring for the milk and the utensils, it amounts to about 100 hours per cow per year, but it is also true that there is profit in all labor which is properly directed and efficiently performed.

Many farmers, on the other hand, have found a solution to the labor and drudgery of milking in the milking machine. With it milking is turned into a pleasure, even for children and other assistants. On practically 100% of our farms, hand skimming of milk has long since been a thing of the past, and there is no doubt that as dairying develops in the country, as it surely will, the milking machine will be adopted by constantly increasing numbers of dairymen. In New Zealand and Australia hand milking today is rare indeed. According to replies recently received from thirty-six users of milking machines in the prairie provinces, but two prefer hand milking, and there are reasons for believing that one of these did not keep his machine long enough to learn how to use it.

SAVING IN LABOR

The milking machine is essentially a labor saving device. While a single unit outfit, or one which milks one cow at a time, is not much faster, if any, than average hand milking, one man can take care of two double units, milking four cows at once, or three to four single units, and thus the number of cows which can be milked by one person in a given time is considerably increased. Instead of hiring extra help to do the milking, many farmers

The Milking Machine in Operation.

intending to stay in the dairy business would be well advised to adopt machine milking. The saving in the cost of labor, of course, will depend upon the initial cost of the machine, the size of the herd, and the cost of labor. The initial cost may vary from $125.00 to $800.00 for outfits milking from 2 to 4 cows at once, depending upon the make and type of machine.

Considering the nature of the work accomplished and the extent to which a milking machine may be used during the year, it is comparable to the cream separator, and, in contrast to the self-binder and many other pieces of farm machinery which are used for short periods only each year, the milking machine becomes one of the cheapest machines a farmer can use.

NUMBER OF COWS NECESSARY

According to satisfied users, the number of milking cows required to warrant the purchase of a machine varies from four to twenty-five. This includes both hand operated and power machines, milking from 2 to 4 cows at once. Power machines are being economically used on herds with ten cows milking the year round.

EFFICIENCY OF MILKING MACHINE

The efficiency of different makes of milking machines as compared to hand milking may be expressed in the time required to milk 100 lbs. of milk, or the number of cows that can be milked per hour. This, however, is obviously not a correct measure of efficiency, as several other points should be taken into consideration before making a purchase. These include the first cost, the nearness to a service agency, cost of upkeep, depreciation, simplicity of mechanism and cleaning, completeness of milking, etc. Aside from the question of first cost and facilities for securing repairs, one's choice in the matter of make of machine is largely a question of personal likes and dislikes. When one has become accustomed to a certain type of machine, there seems to be no other just as good.

POWER TO OPERATE

At the Manitoba Agricultural College, a one-horse-power single phase motor successfully operates an installation, handling up to four units at once. The same motor is arranged to supply power for a root cutter when not operating the milkers. A gas engine of slightly larger capacity would doubtless be required to develop the same power. On the average farm it is more economical to instal an engine of sufficient power to be used for all the ordinary purposes for which a stationary engine is required in the barn.

It is the general experience of users of power milking machines that practically the only trouble met with is engine trouble. This is especially the case during the severe winter weather. Engine trouble can hardly be classed as milking machine trouble.

Questions which naturally come to the mind of the prospective buyer of a milking machine are:—

Will a machine milk cows clean?

Will cows give as much milk as with hand milking?

Will it injure the cows in any way?

HAND STRIPPING IMPORTANT

One of the essentials to the successful operation of the milking machine is proper stripping as soon as possible after the machine is removed from the udder. The amount stripped out averages less than one pound per cow per milking. This, of course, varies somewhat with the amount of milk given, whether or not the cow is naturally a hard milker, whether or not she is holding up her milk, and also with the length of time the machine is left on the cow. Practically all machines will milk fairly clean if left on long enough and the udder is kneaded with the hands. Some use the machine to draw the bulk of the milk only, and move it to the next cow or cows, as fast as the stripping is done. This is believed to be a good practice.

It is well known that as the quantity of milk in the udder diminishes, the machines milk more slowly. Hence, when the bulk of milk has been drawn by the machines and one is ready to strip, there is no object in leaving the machine on longer, as it can be done just as fast or faster by hand. In many cases the most of the cows are strippers during the winter months, and it is found that there is no advantage in using the machine during this period. However, to make the best use of a milking machine it is obvious that a herd

should be managed so that about the same number of cows will be milking the year round. If the adoption of machine milking would bring about this desirable change in the management of all dairy herds into which it is introduced, there is no question but that there would be more money in dairying than under the present system.

In many herds there is found a cow or two that does not take kindly to machine milking and requires more stripping than the average, but as a rule such are naturally hard milkers and are often undesirable dairy cows in other respects. Since such cows are few in number, as a rule, they could be removed from the herd to advantage.

Heifers usually take more kindly to machine milking than mature cows, and it is good practice to begin the use of the machine at the start of the lactation period rather than later. This last statement applies to cows of any age.

QUANTITY OF MILK

Of thirty-six replies from milking machine users, only one reported that less milk was secured than with hand milking; eight reported slightly more milk, while the rest reported securing the same quantity or that they had made no comparisons.

In a comparison between machine and hand milking at the M.A.C., a little more than one pound of milk per cow per day was secured with the machine than by hand. This has been the experience of at least one machine user from whom we received a reply, and this man weighs the milk from each cow at every milking.

UDDER TROUBLES

With regard to injuries and udder troubles, it is sufficient to say that if a machine is properly used and cared for, no more trouble is experienced than with hand milking.

EXPERIENCE OF A MACHINE USER

The following letter from one who has used a milking machine constantly for eight years should be of interest here:—

"I have been well satisfied with my milking machine ever since I got it. I believe that if anyone does not have satisfaction, it is his fault, not that of the machine. There may be other machines as good or better, but if they are better, they are almost perfect.

"Anyone who says he does not get as much milk should say how he knows. I have weighed for over eight years from every cow, night and morning. Not many do that. Any time my engine does not work, which is not often, my cows give from one to two pounds per day less, and I am not a slow hand milker—six minutes to the cow. I have heifers making very good R.O.P. records, milked all the time with the machine. I keep Ayrshire cattle, about two-thirds of them pure-breds. Of course, some cows milk better with the machine than others. I find that cows with large teats do not milk as well as the small teated ones; they have more to strip out. I think perhaps a man with large teated Shorthorns might not get as good satisfaction as I do.

"I use two single units and move my units as fast as I can strip. I do not wait if a cow is not milked out. I move and strip her. I am a cream shipper and separate all my milk. From the time I start my engine till separating is all done, it takes me four minutes to the cow, and weighing takes a little of the time. I have never tried without weighing.

"If I can be of any help to anyone re milking machines (that is with the kind I have—I know nothing of any other) I will be pleased to do so."

WASHING THE MILKING MACHINE

No one will find satisfaction in the use of a milking machine unless it is kept in proper sanitary condition at all times. This requires from 15 to 20 minutes per day on the average. Besides the usual washing after each milking, all parts with which milk comes in contact should be dissembled at least twice a week in summer and once a week in winter, and washed thoroughly in hot water in which a suitable washing powder is dissolved. Brushes supplied with the machine should be used at these times. The after milking washing should consist of first rinsing with cold or luke warm water drawn through the machine by vacuum. The flow should be broken occasionally by pulling the teat cups out of the water and then immediately immersing them again. This is done 10 or 12 times. Repeat the rinsing process, using hot water containing washing powder. Then rinse the machine with clean water drawn by vacuum.

Under average farm conditions the machine parts, consisting of all milk tubes, teat cups, etc., should be treated by one of the two following methods:—

After the usual washing and after the air tubes are plugged on machines of the inflation type, these parts are placed in water which has previously been brought to a temperature of between 165 degrees F. and 170 degrees F. This temperature should be maintained for 15 to 20 minutes, and then the water is allowed to cool and the machine parts left in the water until the next milking. A thermometer should be used in controlling the temperature of the water. This is a simple method and one which is being successfully used at the M.A.C. If steam is not available, the water may be heated in a wash boiler on an oil stove in the dairy.

Another satisfactory method is to immerse the parts in a sterile disinfectant solution. Such a solution may be made of chloride of lime, B. K., or sterilac. The trouble with such solutions is that they are frequently kept in use when not actually sterile, but rather are often potent sources of contamination. Unless these are kept fresh and in a sterile condition, they are worse than useless.

Milking machine pails should be washed and sterilized after each milking the same as other metal dairy utensils. This also includes the cover of the pail and the moisture or check valve on the head of the machine or pail lid. The vacuum line should be cleaned at least once a month by drawing hot water containing washing powder through it with vacuum. If milk is drawn in the vacuum line, the pipe should be cleaned immediately after milking.

FACTORS AFFECTING THE FAT CONTENT OF COWS' MILK

In Manitoba whole milk is generally paid for by the distributing companies on the basis of so much per 100 lbs. testing 3.6% butter-fat and 5 cents per 100 lbs. more or less for each .1% over or under 3.6%. The returns on this basis have been the cause of much general dissatisfaction on the part of milk shippers, and this entirely through a lack of appreciation of the various causes of butter-fat variation. It should be understood that the same methods of sampling and testing milk are followed by all companies, and that such are invariably performed with extreme care by experts. The cause of varia-

tion in fat content between the milk of two herds must, therefore, be sought for in other directions. Following are the various known causes of fat variation:

1. **Influence of Breed.**—It is a matter of fairly common knowledge that herds vary widely with respect to the quality of milk yielded. Likewise the milk of grade cows will vary in the direction of the average for the breed of which they carry a predominance of blood. The average fat percentage in the milk of the various standard dairy breeds is as follows:—

Jersey	5.35	Ayrshire	3.66
Guernsey	4.98	Holstein	3.45
Shorthorn	4.05		

It is not difficult to understand from this how two farmers handling Shorthorns and Holsteins respectively may constantly be receiving very different butter-fat test figures.

2. **Influence of Individuality.**—Cows of the same breed differ with respect to butter-fat yield. Indeed, it is not uncommon to find as wide a variation between individuals of the same breed as between individuals of different breeds. It is by virtue of this existing variation between individuals that progress is made within breeds. By constantly selecting bulls from high fat producing dams, there are being fixed in many herds strains of high fat producing cows.

3. **First and Last Drawn Milk.**—The first drawn milk runs as low as .76% fat, and the last drawn as high as 9.8%. It is conceivable, therefore, that the fat content of the mixed milk of a herd may fluctuate according as the milking is performed efficiently or otherwise.

4. **Effect of the Period Between Milkings.**—When the intervals of time between milkings are unequal, the milk yield is generally smaller after the shorter period, but this milk is slightly richer in fat. For this reason the evening milk is commonly richer than the morning. When the intervals are the same, however, there is no appreciable difference in richness between evening and morning milk.

5. **Effects of Advancing Lactation.**—For a few weeks after calving cows normally give richer milk than during the following month. It then remains fairly constant in fat content until towards the end of the lactation period, when it again increases.

Where there are many "strippers," therefore, at one time in a herd, the milk test should be comparatively high.

6. **Effect of Body Condition at Calving.**—The condition the cow is in at time of calving has a very marked effect for a time on the butter-fat yield. We have had Holstein cows at the College calve in exceptionally high condition and yield milk for a time testing over 5%, whereas their normal fat percentage was 3.2%.

Such is the dairy temperament which impels a cow to draw upon the fat stored in her body and convert it into butter-fat. Hence the advisability of liberal feeding during the dry period whereby a reserve is built up in the body and the yearly fat production increased.

7. **Effect of Feed.**—Despite a very general impression to the contrary, in the strict sense, neither kind nor quantity of feed affects the percentage of butter-fat, always provided a cow receives sufficient nutrients to maintain

her body weight. Cows which are greatly underfed may yield milk lower in fat than normal. And with increased feed allowances the fat percentage will increase, but only until a normal plane of nutrition is reached; thereafter the fat will remain almost constant.

It should be understood in this connection that it is the glands of the udder which determine the characteristics of milk produced by individual cows, and not the body or digestive tract. Were it possible to graft the udder of the Jersey on a Holstein, we would then expect the Holstein to give Jersey-like milk. In other words, butter-fat is largely an inherited character, and can, therefore, be increased materially and permanently only by selective breeding.

8. **Effect of Temperature and Weather.**—Investigations seem to have revealed that the tendency is for cows to give richer milk when the temperature falls, and poorer when it rises. From investigations the writer has been unable to confirm this finding. The variation from this cause is at best slight. Moreover, different cows react differently to the same condition. The period of oestrum, for example, effects a marked increase in percentage of fat in the milk of some cows, but has just as marked a tendency to depress the fat yield in others. Generally a fevered condition will bring about a fat increase, but such is invariably co-incident with a much reduced yield in milk.

9. **Variation Due to Causes Unknown.**—With all the factors mentioned known to cause variation, there yet remains considerable to be accounted for. Daily records kept have revealed fluctuations in fat percentage in the milk of individual cows which cannot be explained in the light of that already mentioned.

One can appreciate, of course, the obstacles which lie in the path of the investigator in this field. Butter-fat is the product of a complicated internal process. The process itself being rather imperfectly understood, it may yet be long before the possibility of control is definitely settled.

Meantime there is sufficient data on hand to establish the fact that milk does vary in point of richness from time to time, and a fuller appreciation of this fact by milk shippers would tend to dispel much of the dissatisfaction with distributing companies which has previously existed.

Part 2

NOTES ON SOME COMMON DISEASES AND DISORDERS OF DAIRY CATTLE

By ALFRED SAVAGE, B.S.A., D.V.M., Dep't. of Animal Pathology.

INTRODUCTION.

What follows is not intended to replace competent veterinary service in any way. Indeed, we recommend the employment of professional skill whenever it is called for, providing that it is reasonably obtainable. There are two good reasons, however, for this chapter:

Many Manitoba farms are a long distance from veterinary help. Here, as elsewhere, common ailments of cattle appear in which the use of comparatively few medicines and simple measures may often save life, or prolong usefulness. There are other cases in which the need for quick action makes it unwise to wait for anyone. Under such circumstances we know that owners are more than likely to do **something.** And, since the right thing is often as easy to do as any other, we believe it should be made known.

The treatments here given have been tested by years of experience. They are believed to be the best practical ones within the reach of intelligent farmers. But they are not infallible, and we particularly caution those who apply them not to expect any amount of treatment to overcome an error in recognizing the disease for which it is given. This is the point on which laymen are apt to make the worst mistakes.

GENERAL CARE OF SICK ANIMALS.

Quite aside from the use of drugs, any definitely sick animal is the better for special care and nursing. There are cases in which this is all that anyone can do. In some countries, notably England, **animal nursing** constitutes a special occupation and commands a very fair wage.

The competent stockman needs little teaching in this regard. For others, we indicate below some of the more important points which should not be neglected.

1. **Quarters.** A really sick large animal of any kind is best in a separate stall or paddock, according to season. If fretful and lonely, it may be given a quiet companion. Ventilation should be sufficient but free from cold draughts.

2. **Warmth.** Any cow suffering from a chill, garget, impaction or after bloat, etc., or merely "off feed," had better be blanketed. In the summer this need be little more than a covering to keep off flies: during the winter several blankets may be required to maintain body heat. Flannel or woollen bandages of almost any kind wrapped loosely about the legs assist in keeping the animal **uniformly** warm.

3. **Bedding.** Few sick animals suffer from too much of this. Both for comfort and warmth there should be plenty of good straw, sawdust or similar

material between the animal's belly and a cold floor. It should be changed as needed. Unlike horses, many cows can empty their bladder and bowels without standing up.

4. **Water.** Clean water should be within easy reach at all times, and the chill taken off it in winter.

5. **Feed.** Only very general directions can be given under this head since the particular ailment from which the animal suffers may determine the proper kind of diet. If the animal is in good flesh, one should feed somewhat sparingly and avoid giving any quantity of grain to cases that are fevered. Freshly cut green feed is generally the best; then, in order, come pulped roots, warm bran mashes containing a trace of salt, fine clean hay and good corn ensilage. Unless there are reasons to the contrary, thin cattle and those without fever may also be fed steamed or boiled grain to which a little oilcake or linseed or even half a pint of molasses has been added. This will often be relished when other feed is refused. The animal's appetite and the condition of its dung afford the most useful indications as to whether the right thing is being done or not. The latter should be kept soft.

It is wise to remove any feed that is not eaten reasonably soon, and to keep the manger or feed pail well cleaned when not in use. Staring at feed in which it has no interest does not improve a sick animal.

6. **"Pampering."** The word covers a lot of the fine points in nursing, but only experience can teach one to bestow this kind of attention. Some animals respond well, while others are only annoyed by it. The use of a cool sponge about the eyes; brushing off the head, ears and neck; giving individual handfuls of green feed; changing blankets and bandages more often than necessary; talking to the animal and petting it: are all included under this head.

7. **Stimulants.** Like humans, severely sick animals are more likely to recover from many illnesses if their courage is not allowed to flag. For this reason the proper use of stimulants has a distinct place in veterinary work. When obtainable, we advise the use of AROMATIC SPIRITS OF AMMONIA as a cheap substitute for whiskey, brandy or rum. The average dose is ONE or TWO ounces, and, like other spirits, it should be diluted at least ten times with water before giving. It may be repeated four or five times daily. Those who have never given it will be surprised at the stimulating effect which a quart of warm, strong, sweetened coffee has on an ordinary sick cow. Properly given, it is without danger and may be freely used when spirits are not available.

DRENCHING CATTLE.

The giving of bulky liquid medicine which an animal will not take by itself is called drenching. It is usually done from a long necked bottle, preferably of metal, though nearly always of glass. The object is to get the medicine into the animal's stomach with as little struggle as possible. Violence and loss of temper ofter make for disaster because the liquid is apt to go down the windpipe into the lungs and there produce pneumonia of a very bad kind.

It is best to have the cow standing in the chain or stanchion. Before giving any dose to an animal we strongly advise the giver to taste (but not swallow) some of it himself. In this way the mistake of giving something

too strong or too hot can be avoided, and any undue resistance from the patient better understood.

Quiet cattle may easily be held by standing close to the head and grasping the nose with the thumb in one nostril and two fingers in the other. More unruly animals require the use of a "bull-lead", a strong man holding the

Drenching a Dairy Cow.

horns, or both. The head is then raised slightly, the neck of the bottle placed in one corner of the mouth and a half pint or so of the fluid poured well in. The bottle is now removed for a moment or so until the animal gulps. This is repeated as fast as the beast swallows until the whole dose has been given. Then the nose is freed.

Obstinate cows that refuse to swallow can often be made to do so by having someone rub their throats as each portion is given. This is much safer than the misguided practice of closing the nostrils until distress follows and then releasing them suddenly.

If the animal coughs, it is an indication that some of the fluid has gone down the wrong way. When this is violent, the head should be released for a few minutes before continuing.

It is well to recognize that some animals are so fractious that any attempt to drench them may be unsafe. Such are not often found among dairy cows, however. Incidentally, many animals that resent familiarity when healthy, become quite docile when sick.

DIGESTIVE DISTURBANCES.

1. IMPACTION ("mawbound": indigestion).

By far the commonest digestive disturbance from which Manitoba cattle suffer is impaction (plugging) of the pauch or first stomach. This condition may be due to either of two very different kinds of feed.

It commonly results during the winter from overfeeding with bulky roughage, especially wheat straw, whole sheaves of the coarser grains, woody sweet clover hay, or similar material. Untended animals at pasture sometimes suffer, especially in times of drought, by eating shrubs and dry grass and not getting enough water. In these cases the paunch becomes packed full of nearly dry feed with which it is incapable of dealing.

Animals may also become impacted from eating too much concentrated feed, such as grain of any kind, oil cake, etc. This often happens to cows that are being extra well fed for high performances at the milk pail. It is the common fate of cattle that rob the grain bin without interruption. In this kind of impaction the third stomach is primarily affected, the paunch only suffering in consequence.

Symptoms often develop slowly, when coarse feed is to blame, but may appear very suddenly in the other type of impaction. In the latter case a cow is said to have "cracked" on her feed. The principal indications are a loss of appetite and loss of cud. The animal usually stands away from its manger or, in the field, away from the rest of the herd. Such cases often refuse to lie down or, if down, are loathe to get up. The muzzle is dry. By feeling the ears, tail-head, and the front of the shanks with the hand, one usually finds some of these parts quite chilled. Often there is a staring, anxious expression to the eye. The back may be slightly arched. Quite often the left flank is bulged out and firm because of the contents of the paunch which lies immediately beneath it. Much less than the usual quantity of manure is passed. The rate of breathing and the temperature are not noticeably changed.

Treatment had best be undertaken promptly. Cases of long standing and due to rough feed are frequently hopeless. The usual procedure for cattle of average size is to dissolve ONE to ONE AND A HALF pounds of EPSOM SALTS (magnesium sulphate) or GLAUBER'S SALT (sodium sulphate) in not more than two quarts of warm water, add a little ground ginger or some molasses if available, and give as a drench. Plenty of drinking water should be allowed afterwards.

One dose of this sort is often sufficient but, if not, may be safely repeated in 24 hours, unless there are signs of improvement. Should two doses be without effect, we advise changing the medicine and giving TARTAR EMETIC along with stimulants.

Tartar emetic is to be had from druggists only and, because of its poisonous qualities, is best kept strictly under lock and key. The total amount for adult cattle should **never exceed one half ounce**: less is often sufficient. The amount named should be dissolved in a quart of water, about one half pint of which is given every three or four hours along with moderate amounts of stimulants.

There are people who prefer oil to salts for this purpose. The dose of RAW LINSEED OIL or COLD PRESSED CASTOR OIL is about ONE

QUART. Under no circumstances should boiled linseed oil or castor oil for machinery be used, since these are poisonous. WHITE MINERAL OIL (RUSSIAN OIL) may be safely given in larger amounts. Other oils are best left alone unless one has had experience with them. In cold weather it may be necessary to warm the oil by immersion in hot water; otherwise it may not flow. This is especially true of castor oil.

After the impaction has been overcome, it is good practice to withhold feed until the animal is really hungry, and then allow only moderate amounts for a few days.

2. BLOAT.

This is a swelling of the paunch caused by an unusual amount of gas. In the fore part of the digestive tract of cattle there is always some gas which is normally belched up from time to time. Only when enough of it accumulates to cause distress can the condition properly be called bloat.

Almost without exception the cause is feed—the kind that ferments quickly. Green alfalfa and clover, particularly if wet or succulent, are well known offenders. Animals turned onto pasture of this kind, when hungry, and allowed to eat their fill, especially if they are not accustomed to such herbage, may be expected to bloat. Sweet clover is not such a bad offender. Frosted roots occasionarlly cause bloating; so do ususual feeds such as beet pulp, brewer's mash, etc., unless the cattle are accustomed to them gradually.

It must also be admitted that in certain cases there is no apparent cause. We have seen calves bloat seriously after getting an ordinary quantity of warm, sweet milk. As a rule, however, bloat is a summer trouble, limited to stock on pasture.

Bloat may develop either slowly or with surprising quickness. The latter kind is the worse.

Tapping a Cow.

There is no difficulty in recognizing the condition. The belly is enlarged, particularly the left flank, which bulges out distinctly and sounds like a drum when slapped with the hand. Breathing is quickened and difficult, finally becoming a series of gasps. Often the mouth is opened in an attempt to get air. The eyes are staring and anxious, and young animals sometimes bawl because of both fright and pain. Unless the condition either subsides by itself or is relieved, breathing eventually becomes impossible because of the pressure inside the ribs and at the base of the lungs. Death in such cases is by suffocation. But lest a timid reader think that most cases of bloat end fatally, we hasten to say that this is not necessarily so. Many animals bloat to a moderate or even an alarming extent and live to do so repeatedly. Others are less fortunate.

Favorable indications are (1) slow development and (2) the frequent and vigorous belching of gas. The reverse of these is bad.

Treatment depends upon the severity of the condition and circumstances,—particularly whether one has to deal with an individual animal or a number of them. In mild cases it is quite unnecessary.

When possible, we advise medical treatment, at least to begin with, in all but really severe cases. This may be given by drenching the average sized cow with **two ounces of turpentine** (oil, or spirits of turpentine) well shaken up with a **quart** of raw linseed oil. If necessary, this dose may be repeated **in an hour.**

The same quantity of aromatic spirits of ammonia may be used in place of the turpentine. In emergency, soft water in which a small handful of "Lux" or other good chipped soap has been dissolved will do to replace the linseed oil.

If the case is severe, if medical treatment fails, or if one has a number of animals to deal with at once, then it is advisable to employ surgical treatment and let the gas out of the paunch through an opening in the left flank.

Such an opening is best made with a pair of instruments known as trocar and cannula. The former of these is a kind of dagger about six inches long, either round or flat and having a sharp point but no edge. The cannula is a sheath which fits it closely and is intended to remain in the wound to keep it open after the animal has been stabbed. Instruments of this sort are widely obtainable and comparatively cheap. We prefer the flat type to the round. To be ready and fit for use, such instruments should be kept sharp and clean. Strictly speaking, they should be boiled immediately before use, though a good rinsing in strong creolin solution (1 part creolin: 20 parts of water) generally suffices.

There is no **exact** spot at which a bloated cow must be tapped. So long as one keeps to the upper part of the left flank and about half way between the last rib and the hip bone, there cannot be much mistake on this score. The spot chosen, however, should be well washed off with a creolin solution (that used for the instruments) before the trocar is inserted.

The actual tapping is done as follows: Trocar and cannula, properly fitted together, are held in the left hand and directed at right angles to the skin at the proper place. Then **both** are driven through the flank at one smart blow given either with the other hand or, better, with a block of wood. They should be driven in as far as possible,—up to the hilt. The **trocar alone** is

then withdrawn. Gas then rushes out, and in so doing may carry bits of feed against the bottom of the cannula and plug it. These may be dislodged by inserting the trocar as often as necessary. Movements of the cannula can usually be seen very plainly, and are due to the wall of the paunch contracting as it deflates.

The cannula is left in the animal until relief is afforded. Usually a few minutes is long enough, though no particular harm will result if the instrument remains in place for some hours. After this the trocar is inserted and the pair of instruments are withdrawn together.

It should be remembered that "tapping" an animal merely lowers the pressure inside its stomach: it does not stop the fermentation. For this reason we believe that a liberal dose of turpentine and oil should be given, even if tapping is resorted to at once. The turpentine stops gas formation and the oil helps get rid of the offending feed.

We hasten to add that "tapping" is not without its dangers and, when reasonably possible, is best left to a veterinary. Liquid from the paunch may escape into the belly and there set up an inflammation, which is always serious. Abscesses sometimes form in the flank and require special attention. Occasionally gas escapes under the skin and inflates the animal as far forward as the shoulder.

On the contrary, it is only fair to state that we have seen men stab bloated cattle most unceremoniously with nothing but a jack-knife and have only good results in consequence. Their luck, however, is no excuse for slipshod work on the part of others.

If it becomes necessary to repeat the use of a trocar, either during the same attack of bloat or a subsequent one, we advise making a separate wound on each occasion at least one inch from its neighbor.

3. SCOURS: DIARRHOEA.

Scours is not a disease in itself, but only one symptom which a number of diseases have in common. For this reason it is not safe to suppose that the cause is always due merely to something confined within the digestive tract. But since this is only a chapter, not a treatise, we shall have to limit our remarks to scours resulting from comparatively simple causes.

In adult animals the common source of trouble is unusual feed. Often good feed, such as lush brome grass or fresh corn ensilage, will produce scours when first given. Fodder which is rusted or smutted or has become excessively mouldy often results in scours; certain swamp grasses, notably "horsetails", are well known it this respect.

Common sense usually dictates the treatment in such cases. If stopping the suspicious article of diet is not followed by recovery in a short time, we suggest first, a moderate dose of raw linseed oil (one pint) to assist in removing the offender, and second giving one or two feeds of good hay and dry bran. Should this be inneffective, one may resort to medicines.

A simple and often effective remedy is powdered prepared chalk. One ounce of this may be shaken up with a pint of water and given as a drench two or three times daily. If the animal becomes weak, the additional use of

stimulants is called for. Those who have access to a druggist will find the following prescription useful:

Powdered prepared chalk ..... 1 oz.
Tincture of opium ..... 1 oz.
Powdered catechu, or tannin .....½ oz.
Water ..... 1 pint (20 oz.)

Mix as a drench for cattle. Label POISON. Shake thoroughly and give at one dose.

Stabled animals sometimes pass "ropes" of mucus which may alarm their attendants. In such cases the cause is a catarrh of the intestine which, for practical purposes, may be regarded as the equivalent of scours. A moderate dose of Epsom salts (see under Impaction, page 38) is more suitable than linseed oil on these occasions. A reduced ration for a few days afterwards usually promotes recovery without the use of other medicines.

4. SCOURS IN CALVES.

Unlike mature cattle, calves often suffer from "scours." With the exception of so-called "white scours," to which reference will be made later, the cause is almost always either feed or feeding.

Too much or too rich milk and sudden changes in the quality of it, such as warm whole milk one day and cold skimmed the next, often induce scouring. So does irregular feeding since, if calves are allowed to go hungry for an anusual length of time, they are prone to drink too much and too fast. Milk that is tainted or dirty or which has come from inflamed "gargetty" udders should not be fed to calves. At times we have seen some of them sucking rotten-looking stuff into themselves and appear none the worse for it; nevertheless we consider that growing sound calves is such an important branch of the dairy cattle business that to expose it to risks of this kind is unwarranted if not foolish. During the first few months of its life, a calf may be so handicapped by a severe attack of scours as not to recover fully for a year.

Treatment. If scours develop while milk is being fed, we suggest first reducing the amount given. If that is without effect, one may try adding one part of lime water to eight or ten parts of milk. (Lime water is made by putting a handful of good **quicklime** into a pail of **good water**, stirring it thoroughly, while slaking is in progress, and then allowing the lime to settle out overnight. The clear solution on top of the sediment is "lime-water"; it should be poured off and is best kept in corked bottles.) Should this fail, after having been tried for a day or two, one may then resort to scalding the milk first and adding a little lime water afterwards.

Finally there is medicine and we know of nothing better than the prescription given on this page. The dose of this mixture (having been well shaken) is from one to two teaspoonfuls two or three times daily. It is easily given in a little warm milk.

As a substitute, one may use formalin, providing he does so with caution. We refer to the same material that is used in treating grain for smut. The dose for small calves is from **two to five drops** of strong formalin; larger animals will stand twice that amount. This substance must be thoroughly mixed in cool milk,—about 5 or 6 drops to the pint, and should not be given **more than twice daily.**

Calves being raised on milk substitutes offer a variety of problems according to what is being used and, therefore, cannot be treated in a routine manner. On general principles we advise making all changes of diet gradually, giving less feed instead of more if scouring does develop and resorting to lime water and medicines only after other means have failed. No amount of medicine can replace proper feeding.

5. "WHITE SCOURS" OF CALVES.

We are mentioning this condition under the head of Digestive Disturbances because that is where those who are unacquainted with its nature will expect to find it. Owners whose stock has suffered from this curse may suggest placing it under Genital Disorders since it is closely associated with abortion, sterility and retained membranes in other members of the herd. It is a highly fatal infectious disease of young calves which may either be born with it or catch it by eating infected material.

Symptoms are usually quite unmistakable. The calf is dull and lifeless; it has a dry muzzle and staring coat; it often refuses to suck or drink or, if not, does so but little, and it scours seemingly out of all proportion to what it consumes.

The discharge is passed in small quantities at a time, often accompanied by severe straining efforts. The nature of this material is unusual. Frequently it is frothy; its color is whitish or gray, and sometimes there are streaks of blood. The odor is highly offensive, and the calf's tail and rump get "pasted up" to a disgusting extent.

The course is generally brief, infected animals becoming pitifully thin, huddled little things in the course of a few days and dying in that kind of attitude more often than not. But the rate of mortality varies with the age. If the calf is infected at birth or shortly afterwards, death is highly likely; if the disease is not contracted until the first two weeks have been safely passed, the chance of recovery is very much increased.

None of the usual kinds of treatment can be counted on to have much effect. There are serums in which we have faith, but such preparations are beyond the non-professional. Even if this were not the case, we are inclined to doubt their ultimate value. For we believe that calves which have lived through "white scours" seldom develop into useful mature cattle but, more than any others, eventually become "shy breeders", persistent aborters or some similar kind of highly unsatisfactory beast.

To prevent its spead is the most important object which practical breeders, by themselves, can attain so far as this disease is concerned. Infected animals should be kept apart from others until they have either died or recovered, when the stalls they have occupied should be thoroughly cleaned out and whitewashed. They should be fed from separate utensils and whoever attends them should look to his hands, seeing that he does not carry infection to other animals.

In circumstances where veterinary advice is not directly available, we doubt very much whether it is worth while attempting to deal with this evil other than by stamping it out. But the severity of it varies considerably and having, we hope, impressed the above sober paragraphs on his mind, we leave it to the owner to decide his own course of action.

SKIN DISEASES.

1. RINGWORM.

This is a common infectious disease caused by a fungus which grows on the skin in round patches up to two inches or so in diameter. It may appear anywhere, but is most common about the head and neck, particularly in calves. It is not serious, but is very unsightly.

At first the hair appears ruffled in small patches which, except on the face, sometimes grow and merge into irregular blotches half the size of a man's hand. Later these spots become covered with rather thick, dry scabs, either white or grey. If the scabs are removed, there remain bald areas of moist skin into which the hair grows but slowly. For this reason the marks left by ringworm can often be detected six months afterwards.

Treatment is simple, but, to be effective, must be thorough. An old remedy consists of painting the spots with **Tincture of Iodine**, every 3 or 4 days. Unfortunately this medicine is irritating if applied close to the eyes and, therefore, has its limitations. A safer remedy is to rub on **sulphur ointment** which can be made by mixing one part of the fine sulphur with four or five parts of lard or vaseline. Still cheaper is the use of **washing soda**. This should be mixed with **just enough hot water** to dissolve it and is applied with a good brush every 2 or 3 days. The solution is allowed to dry on the skin. Some cattlemen prefer simply moistening the patches with a rag soaked in **kerosene oil**.

Should ringworm become very prevalent in any stable, we advise clipping the animals before treatment and burning the clippings, also using whitewash rather liberally on the stalls, door posts, walls, etc. This is, admittedly, somewhat radical and can be done only when the season permits.

2. LICE.

There are two kinds of lice which annoy cattle and the symptoms they produce are quite different.

A. **Sucking Lice.**—These are the 'ordinary' cattle lice, presumably so widely known as to need no description. They are found mostly about the ears, poll, neck and withers, also under the fold of the flanks of infested animals. They live by sucking blood. A few of them probably do no practical harm, but where there are some there may soon be many, and a thoroughly lousy animal loses condition very rapidly. Not only do stabled animals suffer, but some of the worst cases we have see have been during the autumn among heifers that had been turned out on pasture for the summer and allowed to "rough it." Under these conditions, there seems no clear explanation why one or two head should be extremely lousy and thin while others, with which they have been running, are hardly infested at all. Yet this is often so.

There are a number of treatments for lice, the choice of them depending upon the season and circumstances. The best preliminary in all cases is to clip the animals closely (and burn the clippings).

Wet Treatments. There are many reliable manufactured cattle dips which come under this heading. These preparations vary so much in their composition that the only safe course is to follow the directions given by the maker.

We have found the following useful:

Soft soap	2 lbs.
Oil of tar	1 lb.
Gasoline	1 pint
Warm, soft water	2 gallons

The soap is first dissolved in the water which is allowed to cool to about blood heat. Then the oil of tar is stirred in and, lastly, the gasoline. Pouring the mixture from one pail to another ensures thorough mixing. The mixture is applied with a scrubbing brush and should be allowed to dry on the animals. It may be washed off in a few days or left on, as one desires.

Dry Treatments. These are not so effective since powders cannot be made to stick onto the under side of the animals. Equal parts, **by bulk**, of **powdered white hellebore** and **fine sulphur** mixed together are as useful a combination as we know of. This mixture should be sprinkled on the animals from a can with a perforated top, and lightly rubbed in. Powdered **sodium flouride** has been well recommended for the same purpose and has the advantage of being quite cheap in spite of its unusual name. We have had no personal expereince with it as yet.

Greasy preparations, while not in favor, are among the most effective. **Sulphur ointment** is probably the best of these. It should be applied only where needed and is, of course, largely wasted on an unclipped beast. Moreover it should not be used in winter, unless the stable is very warm, because a greased animal is very prone to loss of heat.

B. **Scale Eating Lice or "Bird Lice."**—These are much commoner on cattle than many people realize, for they are so small that it takes sharp eyes to see them. They do not bite their host and rob it of blood; consequently there is no great loss of condition from their presence. But they do eat scurf and hair. If numerous, they set up an itchy condition often mistaken for mange. While they may be found anywhere, their favorite location seems to be the tail-head and quarters. Scurfy, hairless patches in these parts, on stabled animals especially, should be carefully examined for bird lice.

Treatment. The affected areas should be well rubbed with **sulphur ointment** or scrubbed with the **soap** and **oil of tar mixture** already given.

3. MANGE.

This is a skin disease from which prairie animals are not yet entirely free. Therefore, even though it is not commonly found among dairy cattle, we believe that owners should know at least something about it. Mange is caused by a mite, smaller than the bird louse and which requires a microscope to be seen. There are several kinds of these mites, and they are all exceedingly active. Thus the disease is highly contagious.

Cattle are usually attacked either on the sides of the neck or on the flanks, inside the thighs or about the tail-head. The general indications are much the same as those of bird louse infestation except that, in addition, there is the formation of tiny pimples and scabs, followed later by a thickening of the skin. And the parts are itchy; animals may rub or lick themselves so much that they do not spend the right amount of time in eating and chewing their cud. They fail in consequence.

The Dominion authorities supervise the treatment of mange, and it is

the legal duty of every owner and manager of stock, as well as of every veterinary surgeon, to report all cases of suspected mange to the proper officials. In Manitoba this is the **Health of Animals Branch**, Dominion Department of Agriculture, 711 Boyd Building, Winnipeg, Man.

UDDER TROUBLES.

1. INFLAMED UDDER: MAMMITIS OR "GARGET"

Inflammation of the udder is a rather common event in dairy herds. It is impossible to estimate the total economic loss produced by this condition in any particular section or province, but it must be considerable. This is not only because of the milk being unfit for use or perhaps suspended altogether during an attack of garget, but because of the "blind quarters" and ruined udders which follow it. In deep milking cattle garget may be a very serious disease and causes annually an unknown number of deaths among the high producers. The seriousness of this condition in good dairy cattle is a penalty specialization; we have not yet known a scrub beast to die of it.

The cause is infection of some sort. Apparently the infection may sometimes lie dormant in the udder only becoming active when the cow freshens or when the udder is exposed to the chill of cold floors. At other times the cause is introduced through the teat canal by the use of milk tubes, probes or teat-slitters. Occasionally a highly contagious form of garget appears in a stable and is unknowingly spread from cow to cow by milkers' hands or by the milking machine. We must remark, too, that individual cases sometimes develop for no obvious reason; but they are infectious just the same.

Cold, dirty flooring, irregular hours of milking and excessively high feeding all help to induce this disease in animals that are naturally predisposed to it (i, e, good cows).

The onset takes place in various ways according to the type of the disease, its severity and the number of quarters affected. In the milder form (catarrhal mammitis) a few streams of watery, stringy or curdled milk may be the only indications. Often these are not noticed until the milk is strained, when some curdled material remains in the mesh.

A severe attack usually begins suddenly. The cow loses her appetite, chews no cud, has a varying degree of chill and is quite evidently sick. Several or all quarters of the udder are hard, swollen and hot. In addition they may also be somewhat tender. Milk flow is either absent or consists of a small amount of diseased material which is slimy, watery, curdled or thick, like pus. Sometimes this secretion has a bad smell; it nearly always tastes salty.

It is impossible to state how long an attack of garget will last or what its final effect will be. Experience is the only guide, and ours has been that all serious attacks of this sort are very bad things indeed, which call for prompt, thorough and persistent treatment.

Treatment.—Mild cases, in which there is no loss of appetite, do not call for special nursing. Cows which are really sick, however, may require all the care and attention which a man can give. On general principles we recommend a box stall, a blanket and a liberal dose of salts to begin with (see under "Impaction"). Then comes attention to the udder itself.

Here there are two main objects in view,—to check the growth of the infection and to get rid of the curdled or clotted material which is imprisoned deep in the gland. The first of these calls for a disinfectant of some kind but, since it is unsafe to inject anything into the udder itself, the only alternative is to give it to the cow. For this purpose we know of nothing more effective than **one ounce of formalin** given as a drench in a **quart** of cold **water** (the colder the better). To cows of average size this dose may be safely given twice daily for 2 or 3 successive days. Some of the formalin is eliminated through the udder, and, in that way, exerts a disinfectant action where required. But, unless the udder is properly massaged and frequently stripped out, there may be no formalin passing through it. Hence the need for special efforts in this direction.

To properly massage an inflamed udder and keep it stripped out calls for a little short of devotion. It may require many hours of tiresome work. As a method of procedure, we suggest the following:—Sit down close to the affected quarters and have a bottle of liniment within reach. Any good mild liniment will do, though we have a preference for either **camphorated oil or belladonna liniment**. Using enough of one of these to insure lubrication, begin with the base of the teat between the two hands and gently, but moderately firmly, massage that region until it is normally soft. Then strip out the milk. Gradually working upwards towards the belly, repeat this process of kneading and stripping until the whole quarter shows improvement. Then begin on the next quarter. In cases where really valuable udders were affected, we have had men relieve each other at this every half hour and, providing that the work was properly done, have seen nothing but good effects. It is such tedious work that no one man is likely to overdo it. The application of large sponges soaked in warm water often helps the udder as well as affords a 'breathing spell' to the attendant. Such spongeing must be continued for not less than 15 or 20 minutes at a time, and the water should be no warmer than the hand can bear comfortably. But it should be that warm; tepid water is useless for the purpose.

Sometimes abscesses form during the course of a few days and burst externally. Their formation may be suspected by the development of hard and painful lumps, at least the size of a man's first, usually in the upper part of the gland. Should this take place, we advise NOT to massage that quarter, but to apply hot sponges instead. This hastens the course of the abscesses. On account of the numerous blood vessels within the udder, we advise those who may be tempted to open a suspected abscess to withhold their knives,—or use them at their own risk. After an opening has appeared, one should gently press out the pus, and, if a suitable syringe is available, rinse the cavity with a mild disinfectant as often as it fills up.

Stimulants should be given if the animal's general condition seems to call for them. This is so in most severe attacks.

Recovery is often slow and whoever attends to such cases is cautioned to let the animal return to her normal ration gradually. There is so much variety to cases of this disease and to its after effects that, in an article of this kind, it is impossible to describe them all. Accordingly, we offer the above only as a sort of general guide and, in this connection, suggest that the inexperienced again read our remarks on the "General Care of Sick Animals."

2. COWPOX.

Cowpox is a peculiar contagious disease of cattle which shows itself mainly by the successive appearance of nodules, blisters and finally, round scab-covered sores on the udder and teats. It is usually spread through the herd quite rapidly by means of the milkers' hands. More annoying than serious, it is sometimes complicated by the development of garget, which makes it awkward to treat. The disease seems to be widely distributed, and, if our correspondence is a reliable indication, is not properly understood.

In the first place, it should be realized that cowpox is essentially a disease of cattle. Humans occasionally become infected. When this happens, the sores are nearly always confined to the hands though, at times, they may spread to the face and elsewhere. The fact that people who have had cowpox do not get smallpox, or, if so, contract it only mildly, does not prove these two diseases to be identical; it merely shows that they are very closely related.

Sometimes cows, which are developing pox, are "out of sorts" for a few days before definitive symptoms appear. The first real indication is the formation of a number of small hard lumps about the size of common beans in the skin of the udder, usually near the base of the teats. These grow somewhat and, in a few days, become blisters containing clear fluid at first, later pus. After these break, healing is rather slow. If not interrupted it takes place under a scab, but, since pox generally affects milch cows, a number of these scabs are repeatedly removed by the hands in milking. As a result, there are unpleasant looking sores called 'pocks'. On the udder these are round, but on the teats they often assume an oval shape, lengthening towards the tips of those parts. Eventually they heal, the entire course of the malady in any one animal being, as a rule, slightly less than three weeks.

In addition to the above symptoms there is frequently a rather painful type of garget, which causes the milk to become changed in appearance, but seldom suspends the flow altogether.

Treatment.—We consider the actual treatment of less importance than to prevent the spread of the infection. When definitive symptoms appear, the diseased cows should be placed by themselves—at the end of the row. They should either be milked by a separate attendant or, if this is not possible, be dealt with **after** the other cattle. It is important that the hands which have been in contact with diseased udders be **thoroughly** washed (warm water,, soap **and brush)** and disinfected in a reliable solution for that purpose ('Izal', 'Pacolin,' creolin or chloride of lime, etc.) as well as dried on a **separate** towel immediately afterwards. In order to make detection of the disease easier, we suggest that the udders of the healthy milking herd be kept clipped. These simple precautions, unfailingly carried out by an intelligent herdsman, will often forestall a great deal of annoyance.

If the disease is not complicated by garget, the only sensible treatment consists in (1) milking the sick cattle as gently as possible and (2) keeping the "pocks" clean and smeared with a bland ointment such as **carbolized vaseline, zinc oxide ointment** or even **camphorated oil.**

Should there be garget, however, this will not do, neither will the usual rather drastic treatment for garget which we have prescribed because, thoroughly rubbing the udder, in these cases, is likely to cause an amount of

unnecessary pain and also to aggravate the pox. In this dilemma we have found the application of heat (as outlined under the treatment for garget) most useful. If the udder is not particularly painful or, if the sores on it are confined to one area (which can be avoided) one may also employ rather gentle massage. In our experience, the use of formalin has been disappointing in cases of this type.

Disposal of Milk.—However mild this disease may seem at times, a sense of hygiene forbids the use of milk from affected cows by humans. The product of a diseased gland is not healthy!

3. "MILK FEVER".

If ever a condition was badly named, this is it. But, as generations have applied these words to a disorder in which there is no fever and in which the milk is seemingly normal, we cannot expect to make any change. Accordingly we mention it with "Udder Conditions," but only under protest.

A Milk Fever Outfit.

From a practical standpoint, "milk fever" is a peculiar form of brain disturbance which generally occurs shortly after a normal calving and is indicated mainly by loss of consciousness. Deep milking cows are affected more often than poor producers. The exact cause is unknown.

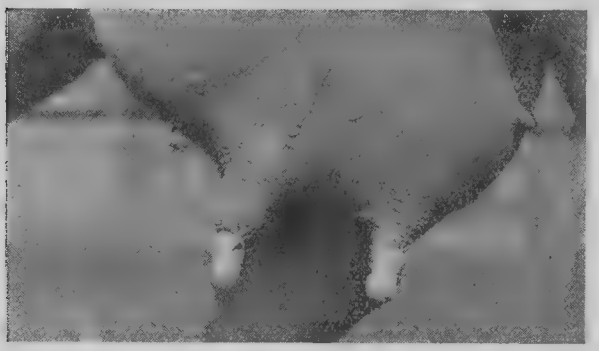
Symptoms may appear before, during or after the birth of the calf, usually from 8 to 36 hours after that event. At times the early stages are passed through so rapidly as to be unnoticed, at other times they may not be exceeded. Trembling, mild excitement, an unsteady gait and rolling the eyes are the first indications. These are followed by the animal going down in a somewhat unusual position, the head and neck being either stretched out at full length or bent aimlessly towards the flank. The eyes remain at least partly open and soon become glassy. In this attitude the cow remains, unaware of her surroundings and lying still in spite of flies, dogs and all effort to rouse her. She may finally roll onto her side because of bloat, or may die quietly just as she is. Some cases recover by themselves, but, until the air treatment was discovered, the majority of them died.

Treatment is simple and, if undertaken promptly, satisfactory. There is one thing to do and one to avoid. The first consists of inflating the udder

with air. This can best be done by means of a "milk fever outfit" consisting of a special kind of milk tube with a valve in it, an air filter and a small air pump, all connected by means of rubber tubes. The whole can be bought for about $2.50. Before using this apparatus, the milk tube should be sterilized either by boiling it or by dipping it in spirits and setting them on fire. The ends of the teats should also be cleaned, if necessary, otherwise a severe attack of garget may result from the use of this apparatus. The milk tube is inserted into a teat and held there with one hand while the pump is worked with the other. When the quarter is moderately distended with air (but not blown up hard) the tube is removed. A length of adhesive plaster, half-inch wide, or a piece of 'electric tape' is wound around the teat to prevent air escaping. This process is repeated until all four quarters have been inflated.

In emergency a bicycle pump may be used. Tieing the teats with string, however, is a bad practice since the parts are likely to become cut by it.

The thing to avoid is trying to drench the animal with stimulants before she is able to swallow. If this is done the dose will almost certainly go into the lungs and may be fatal.



Udder With Teats Properly Taped.

About an hour after having been inflated, most milk fever cases begin to recover their senses. If not, we suggest pumping in some more air. As a rule, however, the majority of affected cows are standing and chewing their cud within two hours time, provided they have been dealt with promptly. If left for some hours in an unconscious condition, their chances for recovery become very much less; indeed it may not be possible to save them.

The tape should be removed and the cow milked as usual after she has been on her feet for two or three hours.

According to the latest theory on the cause of this condition, it may be largely prevented by the liberal use of molasses. This should be fed from a few days before calving till about a week afterwards.

TEAT CONDITIONS.

(1) OBSTRUCTIONS AND HARD MILKERS.

We are continually being asked what to do for cows affected with obstructions of some kind within the teat canal and for hard milkers. Both conditions are the cause of much bad language, and we sympathize with those who do not know enough words to relieve their feelings thereby. Nevertheless our advice is DO NOT INTERFERE WITH THE TEATS.

There are instruments of many kinds on the market for dealing with these conditions. They vary from simple, cone shaped plugs for hard milkers

to elaborate snares for catching internal warts. Providing they are properly selected and used with the strictest cleanliness, many of these things are highly satisfactory. But our experience has been that **in average hands** they cause infected quarters and lacteal misery out of all proportion to the benefit derived from their use. Hence, as a general policy, we advise owners to seek professional skill in these matters. If that is not available, the really troublesome cattle had best either be used as 'nurse-cows' or disposed of while still useful.

(2) INJURIES.

Injuries to the teats usually occur in the form of tears caused by thorns, barbed wire or similar objects; at times they result from having the parts trod on while lying down. While these may often be serious to the usefulness of the sufferer, the nature of such injuries varies so much that we can only offer very general advice regarding their care.

Simple scratches and straight cuts should be well washed with a mild antiseptic solution (1% creolin in water), allowed to dry and then kept soft by the application of a simple ointment such as **carbolic** vaseline. If the cut happens to be crosswise to the length of the teat (as is often the case) and shows a tendency to gape, it should first be cleaned, as above, and then the edges may be drawn together and held there by the application of **adhesive tape.** But the parts must be perfectly dry, otherwise this material will not stick in place. (We refer to the **surgeon's adhesive** for this purpose; **not** the electrician's). It may be removed by wetting it with a little gasoline.

Lacerated, irregular wounds are likely to deform the parts in healing and are, therefore, more serious. In many such cases we know that herdsmen are too anxious to get rid of a loose piece of flesh by simply trimming it off. Unless the piece in question has only a very small attachment or is extremely soiled or dried up, this is bad practice. The reason is that it will be replaced by a scar of nearly equal size which will later shrink and, in so doing, may destroy the shape of the teat. Thus, on general grounds, we recommend trying to preserve all loose flaps when there is any hope of being able to do so.

In treating such cases it is nearly always necessary to first control the cow. This may often be done by the use of a "bull lead" in the nose combined with a fork handle strongly held between the hind legs—just above the left hock and in front of the right one. Failing that we suggest squeezing the animal behind a large swing gate or, if necessary, roping and throwing her. The parts are then thoroughly cleaned with a warm, mild antiseptic solution and the loose flap replaced in position. Here it should be either bandaged, if there is still bleeding, or retained by the use of adhesive plaster if the teat can be suitably dried. In the former case the bandage should be "soaked off" with antiseptic 24 hours later and replaced by adhesive. All such injuries should be regularly cleaned and dressed until there is no doubt as to their progress.

We know that milking such cases is a necessary and unpleasant task at times, and think that it should be reduced to a minimum for the time being. There is no other way out of the situation except for those who are confident of their ability to use "milk tubes." And, we repeat, these are not for the inexperienced.

RETAINED MEMBRANES, ABORTION, STERILITY, ETC.

All branches of the dairy business are founded upon successful reproduction. If that process results in the annual addition to the herd of a healthy calf by each mature female, the breeder's success is almost assured. But this ideal state of affairs is practically never the case. Irregular-breeding and barren cows, abortions and the birth of weak, sickly calves all combine to exact a varying degree of toll from nearly every collection of animals large enough to be called a herd.

Sometimes these losses are so slight as to pass unnoticed. At other times they are largely in the form of "shy-breeding" or sterile cattle, and it usually requires some time before the owner realizes that such are very unprofitable animals and decides upon definite action. Occasionally, however, there appears a more spectacular form of breeding loss, a so-called 'abortion storm' which lasts a varying time and causes not only great damage to the calf crop and production of milk, but leaves a number of diseased, barren and dead animals in its wake. These outbreaks are commonly refered to as "contagious abortion" and are widely believed to be the result of a special infection which only attacks cows.

We do not pretend to have settled the vexed question of abortion and allied losses in cattle, but have some definite, if unaccepted, ideas on the subject. We hold in the first place, and consider it scientifically demonstrated, that most of these losses are due to a variety of infections, and that this group of infecting agents is capable of causing any one or all of the losses mentioned. Further, we are completely satisfied that the herd bull not only may be a passive agent in their spread but is frequently diseased himself. In the latter case, no amount of treatment can make the herd reproduce satisfactorily until this animal has been replaced by a sound sire.

The practical breeder, however, is not interested in beliefs and theories; he wants results. To this end we recommend those having troubles of this kind to do two things.

(1) Have their herd sires examined. This is a matter in which the Agricultural College is willing to lend assistance.

(2) Have their aborting, irregular and sterile cows examined, "culled" and treated by a competent veterinary surgeon.

Time was, not long ago, when we believed that owners by themselves could do a very great deal to control the losses under discussion. This was supported by some good evidence. But it was also faced by some dismal failures and, since the part which the male animal may take has been exposed, we are forced to the conclusion that professional help is necessary. Where this cannot be had, the following notes may be of some assistance:

RETAINED PLACENTA.

Cows calving at full term sometimes retain the membranes which covered and nourished their offspring before birth. A larger number of cows which calve prematurely and the majority of known aborters do so. The reason, in all cases, is that the womb is not only inflamed but has been in that condition for some time. Thus the retention is merely a symptom. Reasonable treatment should aim at remedying the cause, more than removing the effects.

Often the fact that its contents have been expelled enables the womb to recover somewhat in 24 hours or so, at which time many cases of this sort "clean" themselves. If the birth has been normal and at full term, we do not suggest that there should be interference until after that length of time.

If the retention persists, we caution against hasty efforts to take away the offending membranes by hand. Instead, we prefer to insert something into the womb which will delay the decomposition of the placenta and allow the contraction of the part to take its course. Gelatine capsules of one ounce capacity, filled with equal parts of **boric acid** and **iodoform** answer the purpose quite well; they can be had from many sources of supply in the drug line. Their worst feature is the odor of the iodoform, which cannot be disguised. One of these capsules is inserted into the genital tract as far as possible by hand and allowed to remain there. (Two may be used in very large animals). It is repeated in a day or two. Before beginning this operation it is necessary to **thoroughly wash** the hand and arm as well as the hind parts of the cow.

We do not pretend that this is a cure for the condition which caused the retention, nor do we imply that it will invariably result in the membranes being expelled. It will not. We are certain, however, that it is a reasonably safe course, requiring no skill and which gives the animal a fair chance of recovery. Those who "know better" will remove the membranes by hand.

If the animal is depressed and "off feed" we advise a dose of Epsom salts, followed by stimulants (see under "Impaction").

ABORTION.

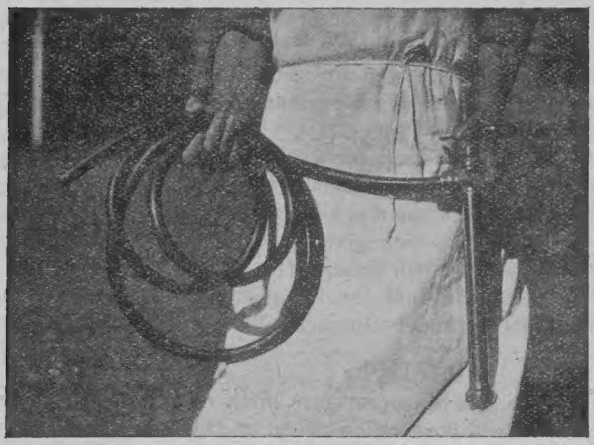
Strictly speaking, abortion is the premature birth of a dead offspring, but, since the majority of calves born much ahead of their time live but a short while, the expression is often used to cover premature births also. And abortion is frequently confounded with temporary sterility or "shy-breeding" because, if it takes place quite early, at five or six weeks for example, and the very small calf does not happen to be seen, the herdsman has no knowledge of it; he only knows that the cow returned to heat at an irregular time. It is for this reason that we consider all losses of the type under discussion ("shy-breeding", premature births, abortion, retained placenta and the dropping of calves affected with white scours) as different degrees of the same thing. For the most part, they are all results of genital infection, and we see no **practical** object in trying to separate them.

If an abortion takes place at less than four months, it is usually complete, that is to say both the calf and its membranes are expelled. On the other hand, if it does not happen until five months or later, the membranes are most likely to be retained. In the latter case there probably will be also a dirty-looking genital discharge, lasting for some days or weeks.

Treatment of any individual aborter may, therefore, begin by having retained membranes to deal with. This done, if necessary, the source of the discharge (the womb) should receive attention. There are many instruments and substances used by veterinarians for the purpose,—a variety which shows plainly that there is no universally recognized treatment which can be applied to all cases both **safely** and **effectively**. This being understood, we suggest a procedure which, in lay hands, meets the requirements as well as any of which we are aware. It consists of flushing out the genital tract of the

aborter with a solution of **bicarbonate of soda (baking soda)** in luke-warm water. This is highly cleansing, non-irritating and, while not antiseptic, certainly does not favor the growth of infection. A suitable strength is from 5 to 7 percent. This can be made by dissolving 1 lb. (roughly one double handful) in 2 gallons of clean, **preferably boiled** water.

For injecting this solution a length of soft rubber tubing is neccessary. The kind of tube sold as a "horse stomach tube", and widely used by veterinarians, is recommended without reserve. It is about 8 feet long, made of the best red Para rubber and costs about $7.00 or $8.00. Properly cared for, one of these will last for years. When not in use, it should be washed out and hung up to drain where there is no dust. It may be attached to an irrigator or a pail with a tap near the bottom, providing there is overhead accommodation, such as a litter carrier, from which to hang the vessel. It may also be used with a double-acting pump, designed for this purpose, and which will easily force the solution up from the ground level. Which ever is the choice, it should be given the same care as the rubber tubing and must be reserved solely for this purpose.



Tubing and Pump Suitable for Irrigations, Etc.

Before beginning this work, the hands and arms should be **thoroughly cleaned** and the hind parts of the aborter (including the tail) washed off with a dilute antiseptic solution (1% creolin). The tube is then inserted into the genital canal as far as the hand can reach and **not more** than a gallon of the solution injected. This should be allowed to return before more is used; otherwise there may be danger of bursting the womb and thereby killing the animal. Often, however, the return is both prompt and violent. The irrigation should be continued in this manner until the returned fluid appears clear. It is impossible to say how often this process should be repeated. Cases in which there is an abundant discharge require daily attention; others need it no oftener than thrice weekly. We recommend, however, that the treatment be given moderately frequently just after the abortion has taken place, gradually becoming less so as the discharge has ceased.

The absence of an unusual or offensive discharge, however, is no guarantee of genital health. For this reason we think it wise to allow two or more periods of heat to pass, after the animal has apparently recovered before breeding her again. At the time of heat, the nature of the mucus in the genital canal is a fair indication of genital health. It should be perfectly clear and very slippery.

To breed an animal which is not genitally sound is to invite disaster of some kind.

STERILITY.

Whatever popular ideas may be held to the contrary, we hasten to state that this is not a disease, nor is it the result of any one disease. In the female it is failure to conceive, and this failure may be the result of so many conditions, infectious and otherwise, that to write about it fully would involve a long and technical treatise. This we refuse to attempt.

SEX HYGIENE.

In herds where there are recognized breeding losses, it must be evident that each female is exposed to the genital infections of every other female through the agency of the bull. This being the case, that animal should be given some care to lessen the danger of his broadcasting infection throughout the herd. A programme of sex hygiene is thus called for, the main points of which can be stated as follows:

(1) No animal which shows any sign of genital infection should be used for breeding.

(2) So far as possible, the bull should be protected from possible infection by having the females on which he is to be used, suitably douched half an hour before service.

(3) The cows and heifers should be equally guarded by the same means carried out on the bull immediately after service (or both before and after).

A number of solutions may be used for this purpose though we realize that, under Manitoba conditions, there is sometimes difficulty in securing a supply of really soft water. If two and a half (2½) Imperial gallons of clean, warm soft water are used as a basis, suitable solutions can be made by adding one ounce of any ONE of the following: Lygol's Solution of Iodine; "Lyzol"; "Izal"; "Pacolin." None of these will cause discomfort. Unfortunately the substances often sold as "Creolin" vary so much in their irritating properties that we refrain from definite recommendation of them.

After the females have been douched, it is essential to make sure that none of the fluid remains in them. This has to be determined by hand. In the case of the bull, there may be difficulty because of either vice or nervousness. Nevertheless the sheath should be filled and emptied at least twice. We also recommend keeping the tuft clipped off.

TUBERCULOSIS.

We do not wish to become involved in a discussion of the specific infectious diseases at present but feel morally compelled to at least mention tuberculosis. The tuberculosis of cattle is not confined to that species. It commonly affects hogs, occasionally horses, and there is undeniable evidence that it may attack members of the human family, particularly children. Happily there is no great amount of this disease in Canadian cattle; there are even reasons for hoping that some day it may perhaps be excluded entirely. Meanwhile we think it too dangerous and costly a malady to deal with other than by radical means. Unfortunately, there is no cure for it, and its detection requires professional skill. For these reasons we urge all owners of dairy cattle who are not certain about their herds being free from this infection, to consult their veterinary advisers on the subject.

Publications of Manitoba Department of Agriculture and Immigration Available for Distribution at time of Publication of this Bulletin

EXTENSION BULLETIN

No. 13—Common Diseases and Disorders of the Foal.
No. 34—Protection from Lightning.
No. 36—Agricultural Society Activities.
No. 37—Farm Butter-making.
No. 38—Practical Cookery.
No. 42—The Cream Separator on the Farm.
No. 46—Lessons in Millinery.
No. 48—Common Breeds of Poultry
No. 49—Hand Selection and Harvesting of the Seed Plot.
No. 52—Birds in Relation to Agriculture.
No. 54—Milk and Cream Testing on the Farm.
No. 60—Fattening, Killing, Dressing and Marketing Chickens.
No. 61—Debating Clubs.
No. 64—Laundering and Dyeing.
No. 65—The Beef Ring.
No. 66—Manitoba Potato Diseases and Their Control.
No. 67—Alfalfa and Sweet Clover Growing in Manitoba.
No. 71—Cereal Diseases in Manitoba.
No. 73—Weeds of Manitoba.
No. 74—Growing Small Fruits in Manitoba.
No. 75—Control of Grasshoppers.
No. 76—The Trench Silo.
No. 77—Hatching, Brooding, Feeding and Rearing Chicks.
No. 78—Beekeeping.
No. 79—Making Silage in Manitoba.
No. 80—Co-operative Marketing in Manitoba.
No. 81—Turkey Raising in Manitoba.
No. 82—Canning, Pickling and Preserving.
No. 83—Cleaning Seed.
No. 84—Breeding and Feeding the Market Hog.
No. 85—Dairy Cattle.
No. 86—Baby Beef Production in Manitoba.

CIRCULARS

No. 16—Pork Making on the Farm (Killing and Curing).
No. 61—Dugouts for Water Storage.
No. 66—The Gold Mine in the Backyard (Vegetable Growing).
No. 68—Weed Control in Manitoba.
No. 69—Couch Grass Eradication.
No. 71—Beautifying Home Surroundings (Decorative Gardening).
No. 72—Dealing with the Weeds Problem in Manitoba (How to Administer the Noxious Weeds Act).
No. 74—Garden Insects and Their Control.
No. 75—Manitoba Rations for Growing Bacon Pigs.
No. 79—Home-Made Brooders.
No. 80—Meat Curing Recipes.
No. 81—Books on Decorative Gardening.
No. 83—Have You Dehorned Your Market Cattle?
No. 84—Good Seed Pays.
No. 85—Prevention of Cereal Smuts.
No. 86—Muskrat Farming in Manitoba.
No. 87—The Root Crop in Manitoba.

MISCELLANEOUS

Noxious Weeds Act (Manitoba).
Manitoba Annual Crop Report.